
Roanoke River National Wildlife Refuge Annual Narrative

Windsor, North Carolina
Calendar Year 2008

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FORWARD

The Roanoke River National Wildlife Refuge (Refuge) staff along with numerous other stakeholders came to settlement in the cooperative FERC relicensing with Dominion Generation (DG) after ten years of meetings. DG was issued a new license on March 31, 2004. The license was amended in March 2005 to replace articles requiring DG to cooperate with the various agencies that make up the Cooperative Management Team (CMT) and conduct studies and monitor the impacts of the managed flows on resources downstream of the dam. The CMT was made up of representatives from North Carolina Wildlife Resources Commission, the North Carolina Department of Environment and Natural Resources, the U.S. Fish and Wildlife Service (FWS), the National Marine Fisheries Service, and the Regional Partnership of Local Governments in an ex-officio capacity. The staff's input has been through participation in the Fisheries and Terrestrial Committees.

River flow would determine, to a very large degree, the success of the FWS's potential refuge habitat management strategies. The Refuge staff has always, since early in the relicensing process in 1994, recognized that DG (formerly North Carolina Power) was a lesser player in river flow management decisions. The belief was, and continues to be, that the United States Army Corps of Engineers (USACOE) was the major player through flood control operations. However, when one considers the extent that the USACOE is also involved in hydro-power production, it gives one cause-to-pause regarding the driving force behind the USACOE's flood waters release policies. For instance, when winter flood releases are such that prolonged, moderate flows cause water to remain on the floodplain far into the growing season of spring, one could question the objective. Is it flood control or hydro-power production to fulfill contracts with Southeastern Power Administration? If releases are to prevent flood damage, why are they such that the resources in the lower ecosystem, including the Refuge, are damaged? If the USACOE Project, Kerr Dam, was built for flood control or to prevent flood damage, why not maintain 35,000 cfs releases in a manner that will disperse flood flows downstream during the dormant season as quickly as possible, mimicking more natural conditions. The 35,000 cfs flows flood the Refuge 14-16" deeper than 20,000 cfs flows, but the latter prolongs, sometimes by several weeks, flood releases. A lot of interested citizens on the floodplain below the project continue to ask questions. The fact that a lot of people, including Refuge staff, are asking questions is the reason Congress funded the current USACOE's Section 216 Study. The Section 216 study, designed to allow the USACOE to review their flood control operations and releases at their John H. Kerr flood control project, got underway in 2005.

Refuge staff continue to participate in various task group meetings ranging from downstream ecosystem, water quality, and recreation, to channel morphology. It is in these task groups that issues are being discussed and studies are designed to address them.

INTRODUCTION

The Roanoke River National Wildlife Refuge (Refuge) was established 10 August 1989, to protect and enhance wooded wetlands consisting of bottomland hardwoods and swamps with high waterfowl value along the Roanoke River (River). The Refuge acquisition boundary involves wetlands in a 130-mile section of the River from the fall line in Weldon downstream to the Albemarle Sound near Plymouth, North Carolina. This area of floodplain encompasses approximately 150,000 acres (235 square miles) of which 33,000 acres are in the Refuge acquisition boundary. Current Refuge acreage totals 20,978. North Carolina Wildlife Resources Commission (NCWRC) acquisition totals approximately 26,000 acres. Both agencies' lands are managed as a joint venture, between the U.S. Fish and Wildlife Service (FWS) and NCWRC, with the exception of a 45-acre fee title easement in Nash County. The Refuge headquarters office is located in the Town of Windsor in Bertie County, North Carolina.

The portion of the Refuge along the River includes part of an extensive wetland ecosystem that contains excellent examples of a number of southeastern plant communities. These are grouped into three natural community types: levee forest, cypress-gum swamp, and bottomland hardwoods. The 45-acre Nash County satellite includes a beaver impounded stream with button bush cover. The 129-acre Sampson County satellite consists of pocosin wetlands.

The River floodplain is relatively narrow from Weldon to Scotland Neck, at times only a mile in width, with natural levees and ridges alternating with sloughs and backswamps in rapid succession. Current Refuge acreage does not include lands in this upper River reach. In the middle section of the lower River, the floodplain becomes flatter and broader, commonly reaching a width of two to three miles, with cypress-gum backswamps increasing in size. The continued presence of levees and ridges make this stretch of floodplain the most diverse and, potentially, the most productive. There are 15,000 acres of Refuge lands in this lower-middle River reach. Below Jamesville the River is essentially at sea level and broad expanses of cypress-gum swamp, as much as five miles across, predominate. In addition to the major vegetation communities described above, occasional oxbow lakes, beaver ponds, and blackwater streams are located throughout and add to the rich mosaic of habitat types in the River's floodplain. Together, these habitats support a rich array of diverse and abundant fish and wildlife species. A total of 6,000 acres in this River reach are designated Refuge lands.

The River floodplain includes some of the more valuable wetlands for fish and wildlife. Fourteen species of waterfowl regularly utilize the floodplain's wetlands. Wood ducks, mallards and widgeon are the most abundant. Other frequently observed species are black duck, pintail, gadwall, green winged teal, blue-winged teal, ring-necked duck, hooded merganser, shoveler, bufflehead, Canada goose, and tundra swan.

At least 214 species of birds, including 88 breeding resident and migratory species, utilize the River's floodplain. The area supports the highest density of nesting birds, especially

songbirds, anywhere in North Carolina. The project area has several rookeries that contain great blue herons, snowy and great egrets, anhingas, and yellow-crowned night herons.

The River, its tributaries and associated floodplain wetlands, provide critical habitat for a diversity of fish species, including anadromous fish. Anadromous fish utilizing the system are striped bass, blueback herring, alewife, hickory shad, and American shad. The status of the endangered shortnose sturgeon is unknown.

The River's floodplain also has a high density of white-tailed deer. A remnant population of black bear exists along the lower River. Gray squirrels and marsh rabbits are abundant. Resident furbearers include raccoon, mink, muskrat, otter, fox, bobcat, beaver, and opossum.

The River's bottomland hardwood habitat supports one of the largest natural wild turkey populations in North Carolina. The prime bottomland hardwood trees on the ancient river ridges and terraces provide excellent food and cover for feeding and nesting turkeys. Limited woodcock also occur along the River. Bobwhite quail occurred in some of the bottomland hardwood habitats in the early 90's, but have not been heard since approximately 1995.

Historical economical uses have been commercial fishing and logging. Logging operations were aimed primarily toward harvesting cypress and green ash. Some cypress-tupelo swamps have been changed to mainly tupelo with a few scattered cypress. Some areas have only small quantities of the ash component. Recreational uses are primarily hunting and fishing.

The Refuge also administers 66 conservation easements consisting of approximately 116 sub-tracts, totaling 2,862 acres. These easements are located in 19 counties, some as far away as 200 miles from Refuge headquarters. The easement and private lands programs were elevated in 1996 with the addition of one staff position, a Private Lands Biologist. When the Private Lands Biologist transferred in 2001, the position was moved to the FWS Wildlife Habitat Management Office, Manteo, NC; however, the easements remained the responsibility of the Refuge. These parcels are generating ever-increasing demands. Shortfalls in staffing have placed the easements as a low priority.

Farm Service Agency (old FmHA) lands inventory also generated two fee title tracts totaling 174 acres; 45 acres in Nash County and 129 acres in Sampson County. There has been minimal management of these satellite areas. These small satellites, 100-200 miles from the Refuge headquarters, create many unique problems.

HIGHLIGHTS

- Table 5 workforce plan disbanded.
- EEO Wilkins participated in a desk audit and received an upgrade to a WG-10
- PLB Kendall Smith's GOV had the catalytic convertor stolen while parked in Refuge parking lot. Due to the theft staff contacted Leaseholder to increase security lighting in the parking area.
- Staff, two forestry technicians from Pocosin Lakes NWR, and a volunteer planted a variety of hardwood trees in several locations on the Refuge.
- RM Chappell completed a detail at Cape Romain NWR,
- The ongoing issue with the proposed route of the transmission line at Sampson County Easements 18C-1, 18C-2 was finally settled. An alternative route was selected by all parties involved, and all paperwork finally received.
- The NAWCA project on the Askew Tract continues to be problematic. Because of design flaws the ability to manage water levels is challenging and continues to consume valuable staff time.
- The second phase of the NAWCA project to plug canals on the Broadneck Swamp tract was completed.
- OA Jager continued to assist Mackay Island NWR with administrative duties and trained their new OA, Sue Spry, who was hired in April.
- The GSA lease for the maintenance facility was finally resolved. The Refuge will be able to stay in the building we have been renting; a 5 year lease was signed in October.
- Staff had to learn an entirely new way to record their time and attendance when Quicktime, the Service's new internet based payroll program, came online in May.
- This was the 4th year of 4-5 field seasons for the Swainson's Warbler project.
- EEO Wilkins continued in his position as an MOCC instructor at various training events throughout the year. He also participated in a large fire detail that encompassed several counties and numerous acres in eastern North Carolina.
- WB Richter visited White River, Cache River, and Yazoo NWR's to learn more about Forest Management Practices in Bottomland Hardwood Forest Systems.

- A data call was received for a report of inventory of conservation easements managed by the Refuge. Realty requested the current ownership information, county, acreage, and date on conveyance for each easement by 5 September and required staff to visit each easement and check for compliance by 1 December. Staff worked hard to audit and complete site inspection reports on all 66 easements located in 19 counties.
- WB Richter exceeded the banding quota for 2008 – 166 ducks.
- Previously reported encroachment activities (a breached wastewater lagoon) on the easement in Orange County (13C) was handed over to LEZO Mike Canada to determine the next steps.
- Refuge staff still continue communication with Realty personnel regarding obtaining a legal right-of-way into the Town Swamp Unit.
- Paperwork was initiated to begin the hiring process to fill the vacant biotech position. OPM/DEU posted the opening with an incorrect starting salary. The announcement was not extended due to the number of applications received (120). All three selectees declined the position. It was decided to cancel the announcement and re-advertise the position. Justification was forwarded to HCM.
- Through a joint venture with NCWRC a summer intern hired by NCWRC collected data on tree cavities on the Refuge.
- WB Richter continued to work with TNC, USACOE, Dominion Generation, and NC and VA State officials regarding flow issues on the Roanoke River.
- Replaced incorrect information panels on Refuge Kiosk.

Climatological Review – 2008

Temperatures (in Fahrenheit)

Average high: 72.3

Average low: 50.7

Highest recorded: 99.8 (June)

Lowest recorded: 16.3 (January)

Precipitation (in inches)

Total for the year: 37.59

30 yr average: 53.41

(Previous Narratives have shown 45 yr precipitation averages. The Peanut Belt Research Station, which tracks the data recorded here, gives a 30 yr precipitation average. This and future Narratives will show the 30 yr average.)

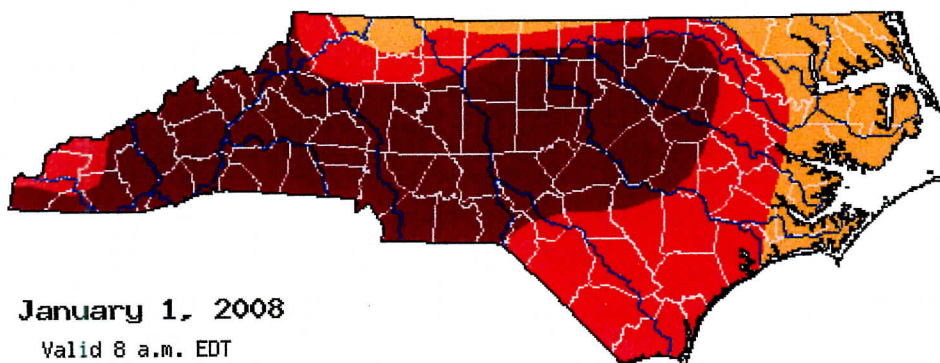
Data was recorded at the Peanut Belt Research Station in Lewiston, NC, which is approximately 20 miles from Refuge headquarters, and obtained from the State Climate Office of North Carolina. All data (100%) was available for 2008.

While data at Lewiston record no snow events for the year, the Refuge did receive a dusting of snow on 19 January. No accumulation, but it did look pretty as it fell. As in previous years, temperatures varied considerably with a low of 21 degrees followed by a high of 72 degrees days later. Temps in January was slightly chillier than last year, averaging a maximum of 41 degrees, with three days in the 60's. January averaged the coldest maximum temperatures (41 degrees), but temps did reach 72.6 degrees on the 8th. March once again heralded the arrival of Spring with high's in the upper 70's. June had the highest temperature of the summer reaching 99 degrees on the 9th. September had the lowest with 54.2 on the 18th.

Drought conditions across North Carolina ranged from abnormally dry to extreme drought throughout 2008. Although the eastern portion of the state recovered more quickly than the western portion, the Refuge did experience all aspects of drought conditions during the year. Precipitation averages ranged from a low of 1.20 inches rainfall in January to a high of 7.60 inches in July, with 2.60 inches occurring on the July 5th.

Month	Precipitation
January	1.20
February	4.18
March	3.21
April	3.99
May	3.88
June	1.88
July	7.60
August	1.83
September	2.48
October	1.21
November	4.18
December	2.61
Total	34.98

US Drought Monitor of NORTH CAROLINA



January 1, 2008

Valid 8 a.m. EDT

Drought Classifications

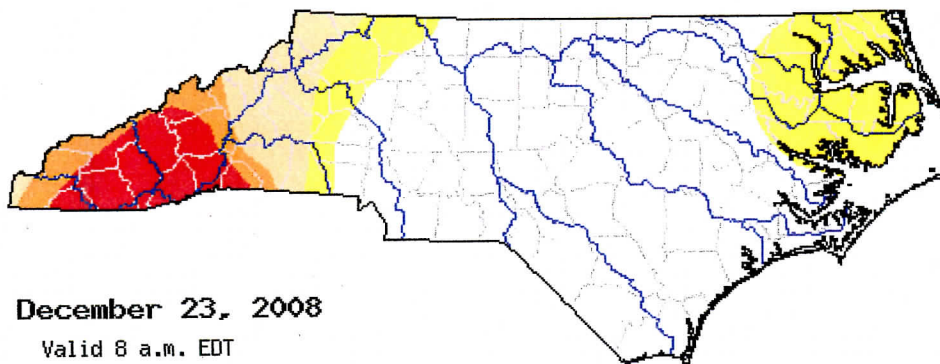
- D0 - Abnormally Dry
- D1 - Moderate Drought
- D2 - Severe Drought
- D3 - Extreme Drought
- D4 - Exceptional Drought

County Boundaries Major River Basins ([View Map](#))

[Hi-Resolution Image](#)

The U.S. Drought Monitor focuses on broad scale conditions. Information provided for North Carolina is relative to the information provided from all other states and the North Carolina Drought Management Advisory Council. Local conditions may vary.

US Drought Monitor of NORTH CAROLINA



December 23, 2008

Valid 8 a.m. EDT

Drought Classifications

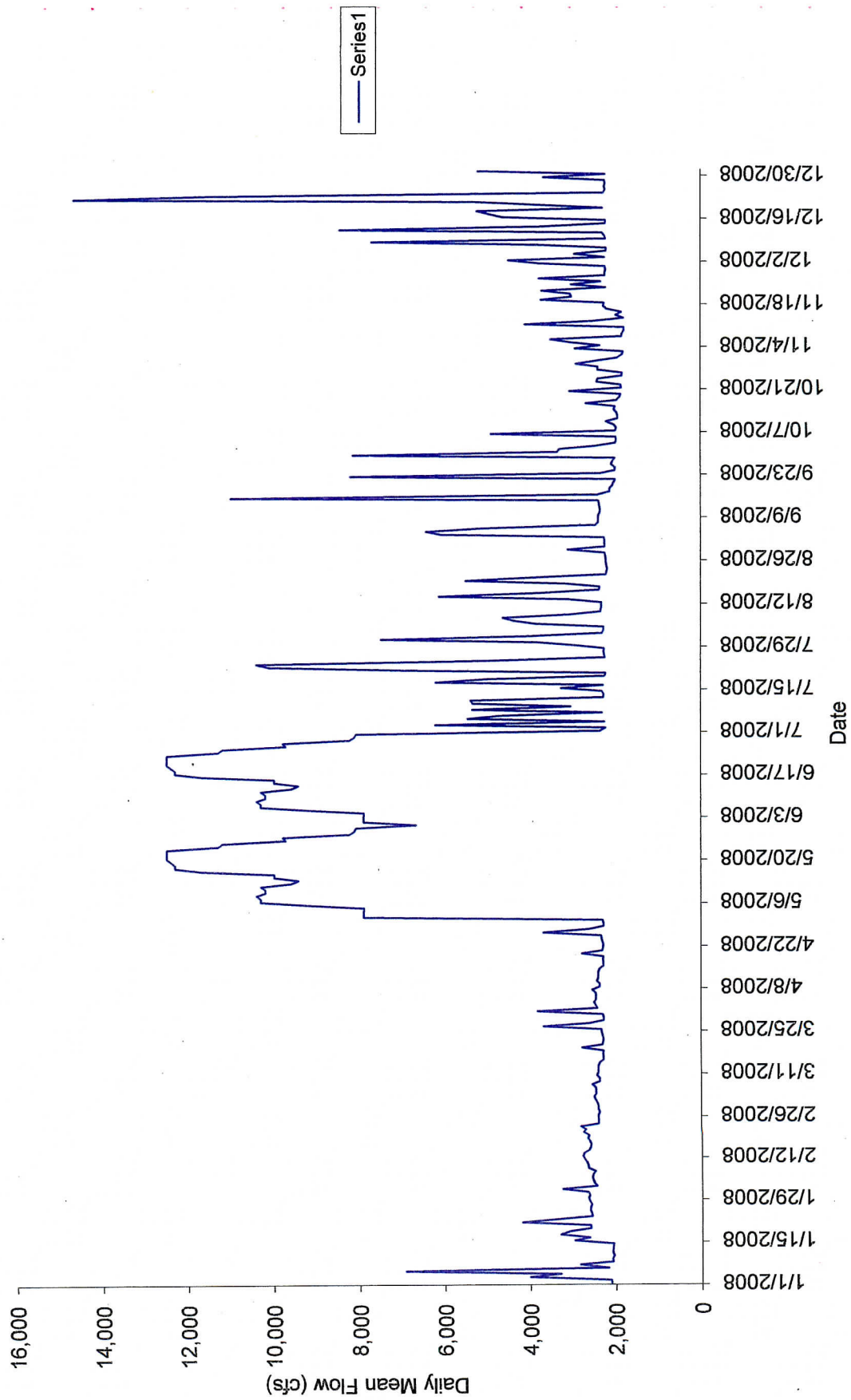
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County Boundaries Major River Basins ([View Map](#))

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The images above were copied from the archives at
<http://www.ncdrought.org/archive/index.php>.

Discharge from Roanoke Rapids, NC

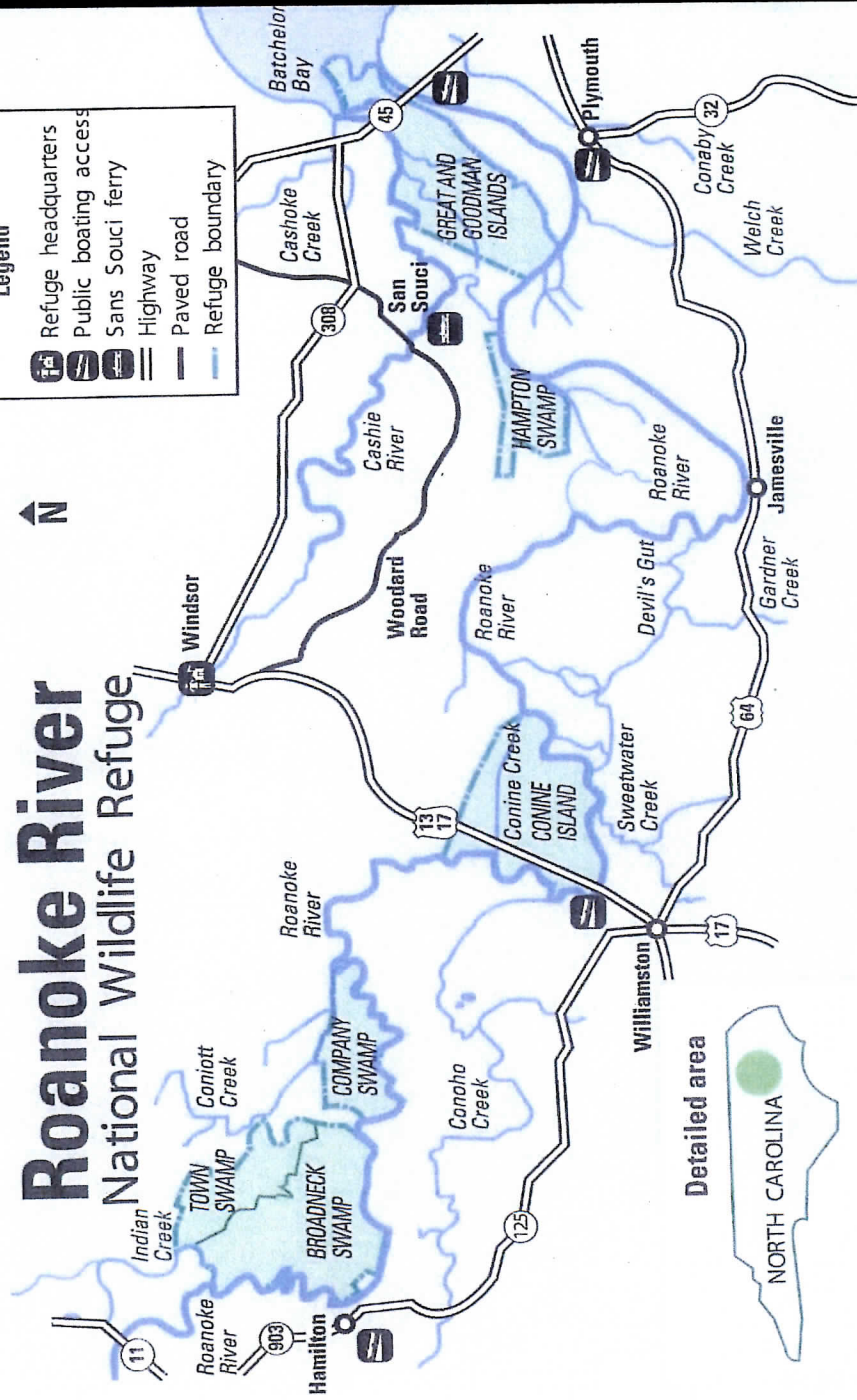


Roanoke River

National Wildlife Refuge



- Legend**
- Refuge headquarters
 - Public boating access
 - Sans Souci ferry
 - Highway
 - Paved road
 - Refuge boundary



1

Monitoring and Studies

1a. Surveys and Censuses

Notable wildlife occurrences at Roanoke River National Wildlife Refuge (Refuge) in 2008:

- A total of 166 wood ducks were banded this year.
- This was the third of four field seasons for a study looking at the productivity of the Swainson's warbler population in the middle reach of the Roanoke River.
- Wood duck box use below Williamston was down 10% from last year.
- North Carolina Wildlife Resources Commission annual aerial flights to survey bald eagle nests spotted an active bald eagle's nest on Company Swamp.
- During spring point count surveys, a Cerulean warbler was found on upper Broadneck just downstream of Indian Creek.

Monitoring Wood Duck Productivity – An overall summary of productivity will be outlined followed by a more detailed summary of box clusters. The overall productivity of wood duck boxes was up from last year. A total of 511 eggs were produced in 32 boxes with 296 eggs hatched as compared to 865 eggs produced in 2007 in 44 boxes in which 475 hatched.

The boxes in Broadneck Swamp (Rainbow Slough) were not monitored in 2008 due to lack of staff time.

Eight boxes remain on the lower Roanoke River; one broke off from the post due to corroding hardware and will be replaced. The rest were previously taken down due to problems with dump nesting, corroding hardware, and predator guards. The seven boxes were checked in May and November. Nesting attempts by wood ducks were made in all seven boxes. Dump nesting (>20 eggs in a clutch) occurred in three of the seven boxes this year with all boxes producing young. The total number of eggs laid was 147, including 87 (59%) hatched and 92 (63%) unhatched. The total number of eggs hatched this year compared to last year was 15% lower.

Boxes located on Broad Creek (11 boxes) and Grennell Creek (8 boxes) were monitored and maintained. Of the 19 boxes, 12 (63%) had active wood duck nests with 95 (55%) of the 174 eggs laid hatching. This compares to last year in which 14 (74%) active wood duck boxes were observed with a total number of 251 eggs laid with 120 (48%) hatching. There were three boxes that contained dump nests (>20 eggs) this year and prothonotary warblers or great crested flycatchers used only one box.

Twelve boxes were checked on Welch Creek. Compared to last year's ten used by wood ducks, eight were used this year. Boxes were checked in May and November. Data collected indicate 143 eggs were laid with 100 (70%) hatching. A prothonotary warbler nest was found in two of the boxes.

The Eastmost River has nine boxes of which five were used by wood ducks. Of the five boxes used, only 47 eggs were laid compared to last year when 110 eggs were laid. Only 14 (30%) hatched which compares to last years 49% success rate and a success rate of 77% in 2006.

Table 1: Wood duck box productivity data for 2008 on Refuge lands.

	Total Number of Boxes	Total # Boxes Used by Waterfowl	Total # WODU Eggs	# WODU Hatched	# WODU Not Hatched (NH)	# Dead Chicks	Hooded Merganser NH	Hooded Merganser Hatched	# Boxes with POWA Nests	Dump Nests
Rainbow	0	0	0	0	0	0	0	0	0	0
Lower River	8	7	147	87	92	4	0	0	0	3
Welch Cr.	12	8	143	100	68	2	0	0	1	2
Eastmost	9	5	47	14	57	0	0	0	0	0
Broad/Grennell Cr	19	12	174	95	102	4	0	0	1	0
TOTAL	48	32	511	296	390	10	0	0	2	5

Cerulean Warbler Survey – On 14 May, WB Richter surveyed the stretch of the Roanoke River (River) from Indian Creek to the canal on Company Swamp for Cerulean Warblers. A total of five birds were found. This is a conservative estimate as survey conditions were not ideal. The slightest rustle of leaves can mask the song of this emergent canopy bird. WB Richter is hopeful that next year will bring better conditions and more available time to better assess the status of this bird in the middle reach of the River.

Roanoke River NWR Breeding Bird Point Count Surveys on Levee Habitats –

WB Richter conducted point counts on established transects (2 on Broadneck Swamp, 1 on Conine Island, and 1 on Company Swamp) each containing 10 points located 250 m apart. This was the fourth year point count data was collected in the hardwood plantations located on Refuge lands purchased in 2004. Green ash, sycamore, and sweet gum plantations made up the fifteen point count plots in the plantations. Within the next few years plans are to manipulate these plantations to promote more diverse hardwood stands. The point count data will serve as a baseline for comparison after stand manipulation is completed.

Each of the 55 points were visited from 15-23 May at which time birds seen or heard within 25 m, 50 m, and over 50 m were recorded at 0-3 minutes, 4-5 minutes, and 6-10 minutes time intervals. The protocol used is based on the Hamel, et. al. "**A Land Manager's Guide to Point Counts of Birds in the Southeast**" and has been adopted with minimal modification by Regions 4 and 5. All points are located 50 m from the River and are in levee habitat. The objectives of this monitoring study are to 1) monitor, overtime, the effects of aseasonal flooding on bird populations; 2) document the density and diversity of birds on the River levees; 3) assist Refuge staff on determining habitat management objectives and priorities for the Refuge; and 4) use the standardized protocol to allow one to compare bird population trends on an ecosystem, regional, and national scale in similar habitat types. The goal is to have a total of 50 points in this one habitat type as recommended by WB Chuck Hunter, FWS Southeast Regional Office.

Table 2 summarizes the 2008 data as it compares to the point count data collected in past years. In reviewing this table, some notable observations are:

- There was not one species that stood out as being significantly more abundant this year than in years past. However, the following species were notably less abundant this year: Eastern tufted titmouse, Northern cardinal, red-bellied woodpecker, and red-eyed vireo. There continues to be an evident downward trend in the number of prothonotary warblers on the levee plots with numbers remaining relatively stable on the plantation plots.
- Listed in order of abundance, the five most abundant bird species counted on levee sites in 2008 were: American redstart and Carolina wren tied for most abundant, blue-gray gnatcatcher and red-eyed vireo tied at second, Acadian flycatcher, white-eyed vireo, and Northern cardinal. This compares with last year's abundance of Carolina wren, American redstart, blue-gray gnatcatcher and red-eyed vireo tied for third, followed by Northern cardinal and Acadian flycatcher. The average number from previous years (1999-2007) indicates that the five most abundant species were: red-eyed vireo, American redstart, Carolina wren, blue-gray gnatcatcher, and prothonotary warbler.
- On levee sites, the most widespread species (species with the highest number of occurrences) listed in order of highest to lowest occurrence were: Acadian flycatcher, Carolina wren, American redstart, red-eyed vireo, and white-eyed

vireo. As compared to occurrence of species tallied from 1999-2007 in which the most widespread species was the red-eyed vireo, Carolina wren, Northern cardinal, Acadian flycatcher, and prothonotary warbler.

- On plantation sites, the most widespread species (species with highest number of occurrences) listed in order of highest to lowest occurrence were: Acadian flycatcher, American redstart, Carolina wren and prothonotary warbler tied at third, with blue-gray gnatcatcher and white-eyed vireo tied at fourth. As compared to occurrence of species tallied from previous years (2005-2007) in which the most widespread species was the Acadian flycatcher, Carolina wren, American redstart and red-eyed vireo tied for third, followed by prothonotary warbler and blue-gray gnatcatcher.
- Listed in order of abundance, the five most abundant bird species counted on plantation sites were: Acadian flycatcher, red-eyed vireo, Carolina wren and blue-gray gnatcatcher tied at third, followed by common yellowthroat warbler and prothonotary warbler. The average number from previous years (2005-2007) indicates that the five most abundant species were: American redstart, Acadian flycatcher, Carolina wren, red-eyed vireo, and blue-gray gnatcatcher.
- Two Swainson's warblers were picked up for the first time on Company Swamp since point count surveys began on this transect in 2001.

Table 2: Comparative summary of levee and plantation point count data collected on Refuge lands in 2008 to levee point count data collected from 1999-2007.

Species	# Occurrences** Levee Sites 2008	Average # Occurrences**/yr. Levee Sites 1999-2007	# Individuals Levee Sites 2008	Annual Average #Individuals/yr. Levee Sites 1999-2007	# Occurrences** Hardwood Plantations 2008	Annual Average # Occurrences** Hardwood Plantations 2005-2007	# Individuals Hardwood Plantations 2008	Annual Average # Individuals/yr. Hardwood Plantations 2005-2007
Acadian Flycatcher*	38	36.0	51	53.5	15	14.7	26	27.0
American Crow	12	15.5	19	22.4	5	7.3	7	1.3
American Goldfinch				0.1				
American Redstart*	35	35.5	63	72.8	12	13.0	3	37.0
Anhinga				0.4				
Barred Owl	3	6.4	4	7.4	1	3.0	1	3.3
Belted Kingfisher		0.2		0.2				
Blue Grosbeak*		0.4		0.4	1	0.3	1	0.3
Black-throated Blue Warbler*	1	1.6	1	1.2				
Black Poll Warbler*		0.8		0.9				
Blue Jay	4	6.8	4	7.3		0.7		0.7
Blue-gray Gnatcatcher*	27	32.8	54	69.6	8	9.7	14	17.3
Brown-headed Cowbird	12	12.8	12	13.8	4	2.3	4	2.7
Bobwhite Quail		0.1		0.1				
Canada Goose	1	2.0	2	4.9	1	1.0	2	2.7
Carolina Chickadee	15	23.6	24	45.6	6	6.7	9	1.3
Carolina Wren	35	36.8	63	70.1	11	13.3	14	23.3
Cedarwax		0.1		0.1				
Cerulean Warbler*	1	0.6	1	0.6				
Chimney Swift*	5	4.8	6	7.6	2	3.0	4	5.7
Common Grackle	2	2.1	2	2.9		0.3		0.3
Common Yellowthroat	19	12.0	21	14.2	7	8.0	13	1.0
Downy Woodpecker	1	9.3	1	9.8	3	7.7	3	8.3
Eastern Bluebird						0.3		0.3
Eastern Tufted Titmouse	18	31.2	23	48.5	7	8.7	7	1.3
Eastern Wood-Pewee*	15	18.9	15	20.6	2	1.3	2	1.3
Fish Crow	1	2.8	1	2.8	2	0.3	2	0.3
Flicker Integrated	2	5.6	3	6.2	1	1.0	1	1.3
Gray Catbird		0.1		0.1				

Species	# Occurrences** Levee Sites 2008	Average # Occurrences**/yr. Levee Sites 1999-2007	# Individuals Levee Sites 2008	Annual Average #Individuals/yr. Levee Sites 1999-2007	# Occurrences** Hardwood Plantations 2008	Annual Average # Occurrences** Hardwood Plantations 2005-2007	# Individuals Hardwood Plantations 2008	Annual Average # Individuals/yr. Hardwood Plantations 2005-2007
Great Blue Heron		1.4		1.6				
Great Egret		0.9		1.6				
Great-Crested Flycatcher*	19	23.8	24	29.8	4	6.0	5	6.7
Hairy Woodpecker	1	4.2	1	4.5	2	2.7	3	4.3
Hooded Warbler*	9	11.2	9	13.3	3	2.7	3	2.7
Indigo Bunting*	12	10.0	12	11.6	3	5.3	3	5.7
Kentucky Warbler*	14	8.1	15	9.8	1	2.7	1	3.0
Louisiana Waterthrush*		0.4		0.4				
Mourning Dove	8	7.2	9	8.4	4	2.0	4	2.3
Northern Cardinal	25	36.6	31	54.5	6	1.0	8	13.3
Northern Parula Warbler*	9	15.6	14	26.0	1	1.3	1	1.3
Northern Waterthrush		0.1		0.1				
Orchard Oriole		0.4		0.4				
Ovenbird*	3	2.4	4	2.6	5	4.0	8	5.7
Pileated Woodpecker	9	13.8	1	16.4	1	0.7	1	0.7
Prothonotary Warbler*	18	35.6	19	67.8	11	11.3	12	16.7
Red-bellied Woodpecker	16	29.6	21	39.6	5	1.3	5	1.3
Red-eyed Vireo*	34	38.8	54	75.5	11	13.0	17	22.0
Red-headed Woodpecker		0.1		0.1				
Red-shouldered Hawk	1	2.9	2	3.4	1	2.0	1	2.0
Ruby-throated Hummingbird*		1.4		1.5		0.3		0.3
Rufous-sided Towhee					2	1.7	2	1.7
Scarlet Tanager*	3	3.9	3	4.5	2	0.3	3	0.3
Spotted Sandpiper		0.1		0.1				
Summer Tanager*	11	17.2	12	18.8	6	4.3	6	4.7
Swainson's Thrush*		0.2		0.2				
Swainson's Warbler*	11	8.0	14	10.0	1	1.0	1	1.0
Turkey Vulture		0.6		0.6				
White-breasted Nuthatch	8	11.9	13	15.9		2.0		2.7
White-eyed Vireo	30	28.8	40	35.9	8	5.0	9	6.7
Wild Turkey	2	1.2	4	1.4				
Wood Duck		1.2		1.3		0.3		0.3
Wood Thrush*	8	18.4	9	23.4	4	3.0	6	3.7
Yellow-billed Cuckoo*	4	12.0	4	15.2	7	4.3	8	5.3

Species	# Occurrences** Levee Sites 2008	Average # Occurrences**/yr. Levee Sites 1999-2007	# Individuals Levee Sites 2008	Annual Average # Individuals/yr. Levee Sites 1999-2007	# Occurrences** Hardwood Plantations 2008	Annual Average # Occurrences** Hardwood Plantations 2005-2007	# Individuals Hardwood Plantations 2008	Annual Average # Individuals/yr. Hardwood Plantations 2005-2007
Yellow-throated Vireo*	2	5.4	2	5.5	1	1.0	2	1.0
Yellow Throated Warbler	1	0.4	1	0.4				
Worm-eating Warbler*		0.1		0.1				
Green-backed Heron		0.1		0.1				
White-throated Sparrow		0.1		0.1				
Yellow-breasted Chat*		0.5		0.5				
Field Sparrow						1.3		1.3
Prairie Warbler						0.3		0.3
TOTAL	4	43.2	76	982.5	15	15.0	249	29.3

* Indicates neotropical migratory bird species

** An occurrence is whether a species was encountered at a sampling site. On levee sites and plantation sites there were a possible 40 and 15 occurrences respectively in 2008.

Roanoke River NWR Permanent Forest Plots - In 2005 WB Richter collected data on five 40 m X 200 m forest health plots located on the Company Swamp, Conine Island, and Broadneck Tracts of the Refuge. The plots are located in the part of the floodplain that is inundated when discharges from the dam at Roanoke Rapids are a continuous 18,500 cfs or greater for more than five days. It is at this discharge that prolonged flooding during the growing season (commonly mid- to late-spring) occurs and is believed to adversely affect the health of the forests being flooded. There are two types of information being collected from these plots; 1) Monitoring the health of the already established trees, and 2) Monitoring the regeneration and survivorship of tree seedlings. The goal of this study is to monitor the dynamics of the bottomland hardwood forest communities at elevations inundated at flows of 18,500 cfs and document any changes. The objectives of the study, overtime, are to: 1) monitor changes in forest structure horizontally and vertically; 2) monitor the effects of managed flows on forest productivity; i.e., species diversity and tree growth; and 3) monitor survivorship of woody seedlings and saplings over a minimum of five years. In order to connect any of the changes observed over the year to managed flows, reference plots in another similar river system with a run-of-river flow regime must be established. Finding a reference plot nearby has proven to be difficult due to differences in scale of the Roanoke River compared to other river systems. The Roanoke River is much larger and has a floodplain that is more intact than other nearby rivers. Instead of locating another watershed, a more appropriate reference may be comparing the seedling survivorship data observed over different hydrological gradients along the Roanoke River floodplain with that found in the Dominion Generation hardwood regeneration study.

The protocol used to establish these plots and collect data follows closely with that discussed in a paper published in *Castanea* 63(3): 262-274; by R. K. Peet, T. R. Wentworth, and P. S. White and is titled "**A flexible, multipurpose method for recording vegetation composition and structure.**" In order to track the health of the mature trees each tree was given an individual number and data on overall tree health, height, and diameter was collected when the plots were first established in 2000 and 2001. In 2004 and 2005, a special effort was made to collect data on the large trees from each plot in order to assess the damage the prolonged flood event of 2003 had on the trees. The results of this effort were described in the 2006 Annual Narrative. Another attempt will be made to collect similar data in 2009 if time permits. Data on tree health will be compared with previously collected data to look at overall changes in vegetation within and between plots and extrapolated to the surrounding bottomland forest community, where appropriate. Nested within each large 40 m x 200 m plot are twenty 1 m x 1 m seedling plots making a total of 100 on the floodplain. The seedling plots were established to monitor survivorship and productivity of different tree species. Data on ground cover, canopy cover, and presence of other species is recorded for each plot. This was the ninth year data on all seedling plots (5 x 20 = 100 seedling plots) was collected; however, data for 2008 is not yet available.

Roanoke River NWR Reptile and Amphibian Survey - A total of 51 plots were established in 2005 with each plot consisting one 2' x 4' sheet of tin, one 2' x 4' sheet of plywood, and one 1½" pvc pipe. Plots are concentrated on the Town Swamp,

Broadneck, Rainbow, Company Swamp, and Conine Island tracts. The plots are located on various floodplain features including: levees—21 plots; hummocks (high points, thought to be old dredge spoil piles, located on the levees)—3 plots; high ridges—8 plots; plantations (pine and hardwood)—11 plots; and bottomland flats (Patuxent study plot on the Roanoke)—8 plots. Of the 51 plots established, only 23 were checked in mid- to late-May. Results of this limited survey can be found in Table 3. Not all plots were checked this year due to lack of staff time. Next year site locations of plots will be evaluated to determine if a plot should be abandoned or relocated.

Table 3: Data collected from herp inventory plots on Refuge lands 2005 through 2008.

River Feature	Species	Species Observed May 2005	Species Observed May 2006	Species Observed May 2007	Species Observed May 2008
Levee	Worm snake	1			1
	Gray tree frog	3	1	4	1
	Green tree frog	2		2	1
	Squirrel tree frog			1	1
	Marbled salamander			3	
	Rough green snake	1 near plot			
Ridge	Marbled salamander	1		4	
	Green tree frog		6	1	
	Slimy salamander		3	3	2
	Squirrel tree frog			1	
	Worm snake		2		
Plantation	Slimy salamander	3	1	7	1
	Green tree frog	2	1		1
	Marbled salamander	1			1
	Spade foot toad		1		
	Squirrel tree frog		2		
	Gray tree frog		1	2	
Bottomland Flat	Red-bellied water snake	1 near plot			
Hummock	Worm snake	1			
	Gray tree frog			2	

1b. Studies and Investigations

The use of “NR” followed by a 2 digit year date in the headings of this section have been found to be inconsistent over the years and will no longer be used.

Roanoke River NWR “The Effect of a Managed Flow Regime on the Bank Morphology of the Roanoke River NWR” (02-42630-03) - One of the concerns the U.S. Fish and Wildlife Service (FWS) has voiced to Dominion Generation (DG) during the FERC relicensing is the effects peaking flows and peaking flows piggy-backed on flood control flows have on bank stability in addition to the prolonged high flows associated with the U.S. Army Corps of Engineers (USACOE’s) flood control project. The objective of the

study is to measure changes in erosion and deposition at selected sites along the River between Weldon to just upstream of Jamesville, NC, and determine whether any observed occurrences can be associated with DG load following releases and/or USACOE flood control releases. Fluvial geomorphologist and Research Ecologist Dr. Cliff Hupp, US Geological Survey (USGS), Reston, VA, has been designated as the principle investigator to look at the effects of the managed flow regime on bank and bed morphology which is being funded by the USACOE via the Section 216 study. WB Richter is a designated collaborator on this study. This year Dr. Hupp and his staff, along with WB Richter, collected measurements on pins at 66 different locations with pin sites beginning downstream of Weldon and extending beyond Williamston. This was the last year of data collection necessary to complete the final report for the USACOE. A draft report titled **"Bank erosion, bathymetry, and water clarity along the dam regulated lower Roanoke River, North Carolina, USA"** was submitted to the USACOE for review and is also currently going through the standard internal review within USGS. The abstract to the citation below follows:

Schenk, E.R.; Hupp, C.R.; Richter, J.M.; and Kroes, D.E. 2009, Bank erosion, bathymetry, and water clarity along the dam regulated lower Roanoke River, North Carolina, USA. USGS Open File Report xxxx-2009, 17 pgs.

ABSTRACT

Dam construction and its impact on downstream fluvial processes may substantially alter ambient bank stability, floodplain inundation patterns, and channel morphology. Most of the world's largest rivers have been dammed, which has prompted management efforts to mitigate dam effects. Three high dams (completed between 1953 and 1963) occur along the Piedmont portion of the Roanoke River, North Carolina; just downstream the lower part of the river flows across largely unconsolidated Coastal Plain deposits. To document bank erosion rates along the lower Roanoke River, more than 700 bank erosion pins were installed along 124 bank transects. Additionally, discrete measurements of channel bathymetry, water clarity, and presence or absence of mass wasting were documented along the entire study reach (153 km). Amounts of bank erosion in combination with prior estimates of floodplain deposition were used to develop a bank erosion-floodplain deposition sediment budget for the lower river. Present bank erosion rates are relatively high (mean 42 mm/yr) and are greatest along the middle reaches (mean 60 mm/yr) and on lower parts of the bank on all reaches. Erosion rates were likely higher along upstream reaches than present erosion rates, such that erosion rate maxima have since migrated downstream. Mass wasting and water clarity also peak along the middle reaches. A reference to the discussion and interpretation of this report's results is provided.

It should be noted that Dr. Hupp's study is looking at the geomorphological processes on the lower River and will not be able to separate out the effects of the flood control from that of hydropower peaking on bank stability. Dr. Hupp is looking at overall erosion rates and rates of deposition and will attempt to characterize the future trends of bank stability in the lower River. As part of their relicensing settlement agreement, DG is required to look at the effects of within week peaking on bank stability as an attempt to

determine the effects of hydropower peaking on bank stability. Dr. Panos Diplas (VA Tech) was awarded the contract to study specifically how within-day and within-week peaking impacts the geomorphology below Weldon. Dr. Diplas has set up twelve sites with special instrumentation to intensively monitor at what point the banks fail. Soil particle size and adhesion characteristics, along with shear stress pressure on the banks from different flow releases, are being intensively measured and monitored to determine the effects of hydropower peaking on bank stability. The study sites identified are located in a seven mile stretch of river reach located about 45 miles downstream of Roanoke Rapids Dam between Scotland Neck and Oak City. To date most of the field data needed has been collected and most of the soils tests have been completed. The next step for the Virginia Tech graduate students (John Petrie and Soonkie Nam) is developing the hydraulic and geotechnical models and integrating the data collected in the field into these models.

A copy of the USGS report referenced above can be found in the **Research and Special Studies** section of the Refuge file system in the respective file folder. This closes the USGS component of the bank erosion study out. Annual updates of the Virginia Tech study will continue until that study reaches completion.

Roanoke River NWR "Effects of Extended Managed Flooding on the Diversity and Abundance of Wildlife, Vegetation, and Macroinvertebrates on the Floodplain on the Roanoke River National Wildlife Refuge" (02-42630-01) - This project is the outcome of a USGS Research Partnership Proposal WB Richter submitted for funding in 2000. The original proposal was to look at the impacts of a managed flow regime on the productivity of macroinvertebrates. Dr. Matt Perry, Patuxent Wildlife Research Center, Laurel, Maryland, agreed to assist the Refuge with its request. Dr. Perry met with WB Richter in November 2001 and discussed study objectives on site. It was decided to expand the study to look at the impacts to plants, mammals, reptiles, and amphibians in addition to macroinvertebrates.

The following is a brief summary of the study proposal:

The study evaluates the diversity and abundance of vegetation, wildlife, and macroinvertebrates in forested areas of the Refuge that are exposed to extensive and repeated flooding which is representative of what is occurring on approximately 130,000 acres of bottomland forest consisting of State gamelands, The Nature Conservancy (TNC) preserves, private lands, and Refuge lands along the River. The working hypothesis is: deviations from the natural historical flow patterns and magnitudes of seasonal discharge may disrupt the life history cycles of organisms that co-evolved with an unregulated river.

Goal and Objectives - The goal is to seek an understanding of the changes in flora and fauna that are caused by the extended flooding of the forested areas on the Refuge. When several years of data are available, Refuge managers can advise managers of the water resources upstream on the River in regard to the optimum schedule for release of water. Specific objectives of this study include:

- Determine the diversity and abundance of wildlife (mammals, birds, reptiles, and amphibians) using floodplains before and after an extended flooding episode.
- Determine the diversity, structure, and abundance of vegetation on the floodplain before and after an extended flooding episode.
- Determine the relative abundance of crayfish and other macroinvertebrates on the floodplain before and after an extended flooding episode.
- Determine if the diversity and abundance of flora and fauna on the floodplain are related to extended flooding or if they reflect normal cycles of flooding.

See previous Annual Narratives for study progress and background. Field work for this project was completed in 2005. Refuge staff were expecting a report of results in 2007. WB Richter has inquired as to when a report can be expected; she has yet to receive a response. This closes out this project. If a report is provided it will be placed in the **Research and Special Studies** section of the Refuge file system in the respective file folder.

Roanoke River NWR "The Effect of a Managed Flow Regime on the Bank Vegetation" (02-42630-03) - The dry spell that lasted from 2000-2002 prevented DG from peaking during the year and the USACOE did not go into flood control mode. As a result, a nice blanket of vegetation became established on the banks. Numerous young trees over 1 m in height were present along with a dense cover of herbaceous perennials and annuals. WB Richter and Jeff Horton, TNC, Roanoke River Project Office, designed a study that will monitor the impacts of future water flows on the vegetation found on the banks and that will also examine the rates of bank erosion. In September and October 2002 thirteen bank erosion/vegetation transects were established. The first transect is located just downstream of Weldon and the last transect is located just downstream of Conine Island. Each transect consists of a plot opposite the other along the River. The plots run 10 m parallel with the River and the width of each plot varies as it runs from the height 20,000 cfs would be on the bank to the River. Nested within the plot on the upstream side are 1 m square plots running the width of the plot starting at the 20,000 cfs flow line to the River. For each meter square plot, data on percent cover of woody and herbaceous vegetation was recorded and in some plots percent cover of each species was recorded in addition to percent cover of herbaceous and percent cover of woody plant material. Photos were taken of each meter square plot to be used as a reference. In the center of each meter square nested plot was placed a metal pin flush to the ground to monitor erosion. The upper corners of each plot were marked with a metal stake for easy relocation. Within the larger 10 m X (length of width) plot, the number of trees between 1 m and 4 m were recorded. A photo was taken of the entire plot and upstream and downstream of each plot. To date only the plots have been established and preliminary data collected. No data was collected in 2003 and 2004. With the help of 2005 Summer Intern Kelly Taylor, all plots were visited, pins located and measured, dead and live trees tallied, and photos of the plots taken. Photos are organized in the office photo computer

and data has been entered in a spreadsheet; due to lack of time no report has yet been produced.

Roanoke River NWR "Roanoke River Tree Ring Analysis" (03-42630-01) - In 1999, as part of Ms. Hochman's research project, tree cores were extracted from large trees in or next to the permanent forest health plots. Target trees were green ash, American elm, laurel oak, and overcup oak. All cored trees were present on the floodplain before the dams were built. The objective of this study is to determine if a growth pattern exists that indicates reduced rates of growth since the River's hydrology was altered in 1953. Dr. Tom Yanosky, USGS, Dendrochronologist, Reston, Virginia, is the primary investigator. All cores have been measured and the dendrochronology analysis is underway. WB Richter has been working with Dr. Yanosky to determine how the data should be analyzed and presented. Dr. Yanosky retired before the project was closed out and, due to health issues in Dr. Yanosky's family life, there has been a significant delay in getting useable results. WB Richter will continue to work with Dr. Yanosky on this project until all data is analyzed to its fullest extent. A report on the complete analysis was due this year; it is now expected that the tree ring data will be analyzed and interpretations made in 2009.

Roanoke River NWR "Investigating Influences on Swainson's Warbler Nest Survival in a Bottomland Hardwood System Subjected to Asynchronous, Aseasonal Flooding" (04-42360-01) - The objective of this study is to collect productivity data and habitat utilization data; i.e., foraging data on the Swainson's warbler during non-managed flood and managed flood years to determine if the altered flow regime impacts the foraging behavior and productivity of the species. For a summary of the collaborators on this study and history of funding refer to the 2007 Annual Narrative.

In 2005, Dr. Lancia, Professor of Wildlife Science, NCSU, recruited a PhD student, Neil Chartier, for this project. Mr. Chartier was awarded a special scholarship that covers tuition and provides a stipend for living expenses throughout the year. Mr. Chartier came from Eastern Michigan University where he received his MS degree. WB Richter has agreed to be a technical advisor on Mr. Chartier's graduate committee. The Refuge will provide a vehicle and boat as needed, as funding permits. For a summary of data collected on this project from 2006-2008 see Tables 4 and 5 below.

Field work begun in 2006 continued from late April through July 2008. From 2007, the nest sample size increased by 57% (2007, $n = 28$ nests, 2008, $n = 44$ nests). Thus far, 217 SWWA have been captured (Table 1). Preliminary results to date indicate apparent nest success was 29% ($n = 72$; Table 2). Infrared video cameras continuously monitored 68 SWWA nests. Preliminary results indicate black rat snakes (*Elaphe obsoleta*) were the main nest predator, as they depredated 26 nests (36% of all nests, 51% of all nest failures). There was a 13% rate of Brown-headed cowbird (*Molothrus ater*) parasitism, accounting for 18% of all nest failures. Forty-nine young fledged from 21 nests (average 2.3 young fledged per successful nest). In addition, the number of birds

tracked by radio telemetry to record territory sizes and find nests by 135% (2007, $n = 20$ birds, 2008, $n = 47$ birds). Analyses of nest videos, telemetry data, and vegetation data are continuing. Planning is underway for the fourth and final field season in 2009 with a final report due 2010.



Digital 06-3-08 Neil Chartier

In early June a wildfire took hold in the peat soils located on the south end of Pocosin Lakes NWR, more than 60 miles from the Hamilton boat landing where this photo was taken. On this morning, visibility was so limited by the smoke that the field crew had to start their work day later than usual.



Digital 06-13-08 Neil Chartier
Marvin Morales, field technician, uses a GPS unit to obtain coordinates of a located Swainson's Warbler nest.

Table 4. Swainson's warbler banding results at Roanoke River National Wildlife Refuge, NC (2006-2008).

SWWA	2006 New	2007 New	Recaptures from 2006 in 2007	2008 New	Recaptures from 2006 in 2008	Recaptures from 2007 in 2008	Total
Male	32	15	17 (53%)	19	10 (31%)	7(47%)	66
Female	11	10	3 (27%)	31	2 (18%)	3 (33%)	52
Hatch-year	12	34	-	53	-	2 males (6%) **	99
Total	55	59	20 (36%)	103	12 (22%)	12 (20%)	217

**One male had a successful nest that fledged two nestlings.

Table 5. Swainson's warbler nest survival at Roanoke River National Wildlife Refuge, NC (2007-2008).

	Survive	<i>n</i>	Apparent Nest Success
Total Swainson's warbler nests monitored	21	72	0.29
Causes of Swainson's warbler nest failure known from video cameras		% All nests	% Nest failures
Black rat snake	26	0.36	0.51
Brown-headed cowbird	9	0.13	0.18
Abandoned (nest with eggs)	3	0.04	0.06
Abandoned (human)	3	0.04	0.06
Weather	2	0.03	0.04
Unknown (no video)	2	0.03	0.04
Unknown (nest with dead nestlings)	2	0.03	0.04
Corn snake	1	0.01	0.02
Carolina wren	1	0.01	0.02
Harvestman/Ants	1	0.01	0.02
Eastern screech owl	1	0.01	0.02
Total Failures	51		

Roanoke River NWR "The Dynamics of Woody Debris on the Coastal Plain Reach of the Roanoke River, North Carolina, and its implications for Aquatic Resources" (07-42360-01) - The principle investigator for this study is Dr. Cliff Hupp, USGS, Reston, VA. The subject expert is Dr. Bertrand Moulin, who resides in France, and collaborators are WB Richter and Mr. Ed Schenk, USGS, Reston, VA. Dr. Moulin has studied the dynamics of large woody debris on coastal rivers in France and has agreed to bring his expertise on woody debris to the Roanoke River. The study will look at how different flow regimes (flood control or hydropower peaking) effect the movement and generation of large woody debris (LWD) in the coastal plain reach of the River. In 2006 WB Richter and Dr. Hupp submitted a Science Support Partnership funding proposal to compete for USGS funds. In 2007 the project was funded for four years receiving an average of \$22,500 per year.

The objectives of the study include the determination of:

- The spatial distribution within the channel of forms and volumes of LWD accumulation.
- The characteristics of LWD in transit and its temporal and geographical origin.
- The residence time of LWD in the River.
- The main transport mechanisms of LWD; i.e., hydropower peaking and/or flood control operations or none of the above.

- The development of a LWD budget and the prediction of the future of LWD budgets based on various management scenarios through modelling.

The goal of this work is to better understand spatial and temporal dynamics of LWD in large coastal plain rivers, specifically the Roanoke River from downstream of the dams to the Albemarle Sound (137 miles) in northeastern North Carolina. The first step will be to review the video footage of woody debris obtained through the USACOE 216 study and determine the spatial distribution, volume, and forms of woody debris within the channel. With an idea of distribution and types of LWD, pieces will be tagged with tracking devices. Locations of the woody debris will be checked periodically and movement will be correlated to flow releases. In addition to tracking devices, remote cameras will be placed on the River levee near areas where large volumes of woody debris have accumulated.



Digital 09-09-08 Ed Schenk, USGS

A large piece of woody debris is prepped to have a tracking tag implanted so that its movement through the system can be monitored.



Digital 08-06-08 JR

Example of a large piece of woody debris with implanted tracking tag.

The second part of this project will be to develop a LWD budget for the aquatic ecosystem. Volumes of LWD that are already present and/or potential in the River will be quantified. This will be based on rates of bank erosion (currently being determined by Dr. Hupp through a separate study) and the volume of trees on the levee on those geomorphic features most susceptible to erosion. Based on the information and the current hydrologic regime, a predictive model of LWD will be constructed. The model will estimate the production, storage, and sources of LWD in the River based on dam releases. It is anticipated that the results of the proposed study will have broad application throughout the Atlantic and Gulf Coastal Plain. The project is scheduled to be completed December 2011 which is contingent on flood events.

Progress made this year: The LWD observed on the video footage has been mapped for the left bank and parts of the right bank. One hundred tags were placed in select pieces of LWD in October. Unfortunately it was discovered that approximately 60% of these tags were found to be not working. The company salesperson stated that the tags were waterproof only to find out later that they were only splash proof. As a result, immediate field efforts will focus on determining which tags are defective and getting them replaced.

Roanoke River NWR "The Effects of Artificial Canopy Gap Creation on the Growth and Development of Bald Cypress Advanced Regeneration on the Lower Roanoke River Floodplain, NE NC" (08- 42360-01) - The overarching goal of this project is to determine the feasibility of restoring bald cypress back into canopy-level dominance in specific areas by significantly increasing available light to already-established bald cypress

saplings via the creation of artificial gaps in the canopy. Though some research has been conducted on the effects of increased light and decreased competition via thinning on residual adult bald cypress growth as well as the effects of varying light levels on young seedling growth, essentially no work has been done on the effects of increased light (release) on understory bald cypress saplings, especially when potentially stunted for long periods of time. These artificial canopy gaps would be created by killing overstory water tupelo trees (by girdling and herbicide injection) directly overtopping saplings within a local area. If the initial (first two growing seasons) growth response of bald cypress saplings is significantly positive, and continued yearly monitoring shows continued growth of at least a moderate pace, the herbicide treatment conducted on experimental plots (and possibly other areas of the Broadneck tract) may be more widely applied throughout the Refuge where current bald cypress advanced regeneration exists.



Digital 02-19-08 JR

Dr. William Conner, Clemson University, standing in a patch of young cypress in the study site. This is an example of trees that will be released from the understory by killing the larger, dominant tupelo trees that are thought to stunt their growth.

A secondary project goal is a clearer understanding of the dates of past logging operations and a more thorough understanding of how past logging operations and continuous dam flow management regimes have affected the forest's development and individual tree growth.

This study primarily intends to examine the growth-response of bald cypress saplings to canopy gap creation. However, as mentioned above, there are several secondary avenues of research. All specific objectives of this study are listed below:

- To determine the rate of initial (first and second growing season) growth response of bald cypress advanced regeneration to significantly increased light conditions from artificial canopy gap creation. Growth and mortality response will be evaluated across sapling size and density gradients, as well as in reaction to initial overstory composition.
- To determine, using dendrochronological techniques, ages and past rates of growth of adult, overstory water tupelo in response to various environmental conditions and large scale alterations to local hydrologic regime (*i.e.*, dam building). If adequate hydrologic data is available, hydrologic conditions at the time of establishment for the present canopy trees will be evaluated.
- To determine, using dendrochronological techniques, ages and past rates of growth of adult, canopy bald cypress trees in an effort to determine an estimate of the general number and ages of cohorts on the floodplain and to similarly examine the species' response to local hydrologic regime (if adequate hydrologic data is available) and dam building.
- To monitor/examine current growth rates of bald cypress saplings in naturally existing gaps of various sizes.
- To utilize the above information in an effort to determine the feasibility of restoration of bald cypress into the forest canopy over significant acreage via release of existing advanced regeneration (of various sizes and densities) through artificial canopy gap creation.
- To utilize the above information in an effort to generally contribute to the overall knowledge concerning the effects of dam flow management on floodplain ecosystems.

METHODOLOGY

Basic Design – In order to clearly understand the effects of increased light on bald cypress sapling community growth and development, both treatment and control plots are necessary. These plots should capture the existing range of variation in terms of sapling size and density. A paired plot sampling design has been chosen, with each pair to contain a treatment plot in which all non-bald cypress woody vegetation will be girdled

and injected with a herbicide and a control plot in which no treatment will be conducted. The herbicide *Habitat* has been chosen as it has proven effective for killing large water tupelo trees in past studies. In order to create gaps in the canopy large enough to provide significantly increased light (full sunlight for many hours each day) and to prevent canopy re-closure, plots are to be 19 x 24 m in size. All non-bald cypress woody vegetation 1.37 m tall or larger rooted in treatment plots will be killed, as will all non-bald cypress woody vegetation outside the plots which shades any portion of the plots from direct overhead light. Initially, treatment and control plots will be generally paired based on relatively close location (i.e., similar hydrology – no plots further than 0.4 km apart, most 60–100 m apart) and similar bald cypress sapling density and size characteristics. Any individual treatment and control plots will be kept at least 40 m apart to avoid edge effects on the control plots from artificially created canopy gaps in treatment plots. Fourteen pairs of plots have now been established. Target tupelo trees were treated in November.



Digital 11-21-08 JR
William deGravelles, Clemson University Graduate student, girdling a large water tupelo tree before applying the herbicide *Habitat*.

2

Habitat Restoration

2a. Wetland restoration: On-Refuge

In 2004, Refuge staff partnered with Ducks Unlimited, TNC, and NCWRC in putting together a package of wetland restoration, enhancement, and acquisition projects throughout the Roanoke River Basin. The package totaling just under one million dollars was submitted to the North American Wetlands Conservation Council to compete for NAWCA funds. WB Richter proposed two projects for the Refuge. The first is geared towards enhancing approximately 500 acres of cypress/tupelo swamp habitat. The basal area of water tupelo will be reduced in areas where tupelo is the dominant species in an effort to open up the canopy. Target trees will be injected with the herbicide Habitat and left to die. The dead trees will provide nesting and foraging areas for cavity nesting birds and food for insectivores. By opening the canopy the expected outcomes of this project will be to increase the density of cypress in these stands and to increase emergent plant growth that will benefit wintering waterfowl when these areas flood. The Refuge received \$50,000 for the tupelo injection portion of the project. WB Richter is working with Dr. William Conner, Clemson University, SC, to carry out the project. Dr. Conner has recruited a Master's student, William deGravelles, to work on this project. Mr. deGravelles study is outlined in *Section 1b. Studies and Investigations* under "Roanoke River NWR "The Effects of Artificial Canopy Gap Creation on the Growth and Development of Bald Cypress Advanced Regeneration on the Lower Roanoke River Floodplain, NE NC" (08- 42360-01)."

The second project submitted was to restore the hydrology on approximately 1,100 acres on the Refuge's Rainbow Tract. Three man-made canals are proposed to be plugged. Two are located on the river proper (BN1 and BN2) just upstream of Black Gut. The third canal is located in from the River off from Black Gut that extends into the swamp along an old logging road that runs east-west. After a series of meetings with agency stakeholders, in February 2005 and again in 2006, it was decided by Refuge staff that permanent plugs with no water control structures would be inserted in the canals in an effort to restore the hydrology in this part of the floodplain. After completion of a USACOE Individual Permit, Division of Coastal Management's Federal Consistency Determination, 401 Certification from NC Division of Water Quality, and responding to concerns raised by the NC Division of Marine Fisheries, the Refuge received the go-ahead to begin work. Work began in September and was completed in October of this year. No major snags were encountered during construction. Instead of barging equipment and material up the River to reach the two canals (BN1 and BN2) it was

decided it was more cost effective to use low impact equipment and come in via the floodplain. WB Richter met with equipment operators before construction began to map out a 10' wide route through the floodplain to avoid impacts to sensitive habitat. Phelps and White, Inc. was awarded the contract to complete the construction.



Digital 10-29-08 JR

A view from the River of the permanent plug in the man-made canal referred to as BN#1. Water will now enter the floodplain via Black Gut located approximately one-half mile downstream.



Digital 10-29-08 JR

A view from the River of the permanent plug on the man-made canal referred to as BN# 2. Water will now enter the floodplain via Black Gut located approximately one mile downstream.



Digital 10-29-08 JR

A view from the river levee of one of the permanent plugs.

2b. Upland restoration: On-Refuge

Before FWS purchased the Town Swamp Tract, International Paper cut a large percentage of the hardwoods located in upland areas that are no longer flooded. Left behind were four one-half to one acre areas that were used as loading and staging areas during harvest operations. These areas have remained open with none-to-minimal tree regeneration occurring. On 4-6 February, Refuge staff, along with Anthony Davis and Kenny Powell, Pocosin Lakes NWR, and Volunteer Curt Kedley, planted 515 hardwood trees in these areas. Tree species planted were swamp chestnut oak, willow oak, cherry bark oak, black walnut, and persimmon. Plot 1 is located across from Rascoe's Ridge, measures 43 x 45 m, and twenty-five of each of the five species were planted. Plot 2 is located alongside Town Swamp main road, measures 36 x 34 m, and 23 cherry bark oak, and twenty each of persimmon, swamp chestnut oak, black walnut, and willow oak were planted. Plot 3 is located alongside Hickory Ridge Road, measures 48 x 45 m, and 35 cherry bark oak, 26 swamp chestnut oak, and 25 each of persimmon, willow oak, and black walnut were planted. Plot 4 is located off from Break-of-Dam Road, measures 16 x 97 m, and 30 each of the five species were planted. WB Richter checked on the survival status of the trees during the growing season. The persimmon were doing excellent, all the oaks seemed to be doing well, but for some reason the black walnut seem to have a very low survivorship. WB Richter will assess the survivorship of the trees in each of the four plots next year and, if necessary, use herbicide to remove competing vegetation.



Digital 02-04-08 JR

Pictured above is one of the plots planted with the five different species of hardwood in an effort to reforest these areas with native species beneficial to wildlife. The colored flags denote a tree.

2c. Wetland restoration: Off-Refuge

Nothing to report.

2d. Upland restoration: Off-Refuge

Nothing to report.

3

Habitat Management

3a. Manage water levels

Managing water levels means something different at the Roanoke River National Wildlife Refuge. Water is the driving force in a bottomland hardwood forest ecosystem. Over the years water has carved the floodplain and dictated where and what plant and wildlife species are found in the bottomland system. The dams located upstream of Refuge lands manage the water levels downstream in ways that do not mimic what would happen naturally. It is impossible to manage water levels on Refuge lands when water enters from different points along the River. This year the annual hydrograph showing discharges from Roanoke Rapids dam indicated a wet January followed by an unusually dry spring with heavy rainfall in late March causing the floodplain to be inundated for three weeks in April. The remainder of the year was very dry with minimal peaking at the dams and minimum flow releases throughout the remainder of the year.

3b. Manage Moist Soil Units

Green Tree Reservoir Project-Askew Tract – For background information on this project refer to the 2007 Annual Narrative. The purpose of this project was to impound water in forested areas during the dormant season to provide habitat for migrating and wintering waterfowl. During periods of drought water can be pumped into the northwest side of the project via a well to provide waterfowl access to habitat they would otherwise not have access to. After 1 ½ years with the project in place the Refuge staff is finding that the project is proving to be difficult to manage and is not meeting all of its intended objectives. One of the challenges is that the project is tied directly to the hydrology of the River. Any flows equal, or greater than, 12,000 cfs will cause water to enter the southeast impoundment via low points along Conine Creek; this is of greatest concern when flows of 12,000 cfs or greater occur during the growing season. The only culvert to drain this impoundment is undersized, is not able to drain water in a timely manner, and can only remain open during work hours otherwise beaver will dam it. A result of having only one small culvert is that several acres of hardwoods may remain flooded in the impoundment during the growing season. Other concerns include the seepage of water into the north impoundment (area north side of the logging road) at flows greater than 12,000 cfs causing this area, that was intended to stay dry during the growing season, to become partially inundated. On 22 February, Refuge staff toured the project area with PL Mike Bryant and APL Scott Lanier, Alligator River NWR, to discuss problems with project design. On 29 April, Refuge staff met on-site with former FWS Migratory Bird

Biologist Bob Noffsinger (one of the original masterminds behind the project), current Migratory Bird Biologist John Stanton, and Private Lands Biologist Kendall Smith to discuss the project design and possible solutions to the problems. A couple of solutions were proposed for the problem with the southeast impoundment; 1) to place another culvert under the road or 2) to place a rock ford in a once historic low point in the road. Refuge staff will continue to search for different solutions and determine which one will best address the problem.



Digital 02-25-08 JR

EEO Wilkins cranked up the pump and well that were installed for the green tree reservoir project on the Askew Tract to ensure everything worked properly.



Digital 02-25-08 JR

It works! Nice fresh water was pumped up in the north impoundment west of the HWY 13/17. The well will be used to flood the area with 6-8 inches of water during periods of drought.

3c. Graze/mow/hay

Roads on Broadneck were mowed in August. Company Swamp was mowed in September. Roads on Conine and Askew were mowed in September, along with the Kuralt Trail parking area, which was also mowed in June.

3d. Farming

Nothing to report.

3e. Forest Cutting

Nothing to report.

3f. Prescribed burning

Nothing to report.

3g. Control Pest Plants

The patch of kudzu located between BN#1 and BN#2 on the Refuge's Rainbow Tract, observed by WB Richter in 2006, has been successfully eradicated from this area. With a source of kudzu now on the Rainbow Bluffs, Refuge staff will have to be forever vigilant in watching for outbreaks on the Refuge. The eradication required two treatments of the kudzu in Fall 2006 and four treatments in Summer 2007.

4

Fish and Wildlife Management

4a. Bird banding

The Refuge had a pre-season banding quota of 125 wood ducks. This year, by the end of July, 166 wood ducks had been banded exceeding the pre-season banding quota. Baiting began in early June and continued through early August. In late July heavy rainfall events and moderate releases from Roanoke Rapids Dam (2 days of 10,400 cfs) caused water levels at the banding site to rise. When this happens it is difficult to keep the ducks on bait; they become more interested in the natural foods they now have access to. Attempts were made to band ducks in early August. The ducks that were in the area showed more interest in foraging in the flooded vegetation than in the corn placed out for them. Banding operations were discontinued in early August. A total of 166 ducks were banded; 2 AHY and 53 HY males and 11 AHY and 100 HY females.

4b. Disease monitoring and treatment

On 28-29 July, Kevin Keel, DVM, and five assistants from the University of Georgia-Athens, College of Veterinary Medicine, conducted a deer herd health check. Refuge staff assisted Dr. Keel and his assistants throughout their visit. Five adult deer were examined; all deer were taken from the Old River Field on private land adjacent to the Askew Tract. These deer herd health checks take place every five years on the Refuge. A complete summary of findings can be found in the Refuge files under **Wildlife – Diseases**. A brief summary of findings follows.

- Based on APC data the herd appears to be within nutritional carrying capacity.
- The levels of important pathogenic parasites, especially large lungworms, are not at sufficient levels to be of immediate concern.
- Selected viral and bacterial diseases have not had high levels of activity on the area.
- The overall health status of the herd is presently such that disease-related mortality is probably not occurring to a significant extent at the present time. Continuation of current herd density is not likely to result in declines in herd health or significant problems with density-dependent disease-induced mortality.

Physical condition ratings, kidney fat indices, and body weights were fair for all five animals; hematologic values of all deer were near the median values of healthy deer. In addition to lesions attributable to parasitism (noted above), pathology revealed cutaneous fibromas in deer, omasal ulcers in two, and thyroid hypertrophy. Serologic tests for antibodies to selected infectious diseases indicated exposure of three deer to the viruses associated with hemorrhagic disease.



Digital 07-29-08 Evin Stanford, NCWRC

Dr. Kevin Keel, DVM, University of Georgia – Athens Vet School, shows a few of his assistants something in the deer's head. The deer health assessments are good learning opportunities for the Vet students who assist Dr. Keel.



Digital 07-29-08 Evin Stanford, NCWRC
A Vet Intern from the University of Georgia – Athens checks a white-tailed deer taken from the Roanoke River bottomlands for ticks, chiggers and other external parasites.

4c. Re-introductions

Nothing to report.

4d. Provide nest structures

With end-of-fiscal-year 2007 money, materials were purchased to build some new wood duck boxes. WB Richter called on the volunteer services of former FWS Southeast Regional Office (RO) employee, now retired, Jim Brown and Curt Kedley who put their talents to work and built 29 boxes. The box design is a bit shorter than those traditionally used by the FWS but should serve the same purpose. Next year, Refuge staff will be looking for assistance in installing at least ten of the boxes on the Askew Tract.

4e. Predator and exotic control

Fire ants are becoming more prevalent along the Askew East and West road, portions of the Broadneck Road running through the Town Swamp Unit, and along the Company Swamp right-of-way. WB Richter treated several active mounds on the Askew East and West roads this past fall and discovered dozens of mounds on the road in the Company Swamp right-of-way. Refuge staff will have to be vigilant about treating these mounds in an effort to control the spread of the ants.

5

Coordination Activities

5a(1). Interagency coordination

USACOE 216 study – For background on the USACOE Section 216 Study and for a review of the progress that has been made on the study in previous years refer to the Annual Narratives from 2001-2007.

The following progress has been made this year on the study that is now due to be completed in 2012:

- Dr. Cliff Hupp, USGS, collected data for the Roanoke River (River) bank erosion study that was contracted by USACOE and submitted a draft report to the USACOE in December. For a summary of findings, see “Roanoke River NWR “The Effect of a Managed Flow Regime on the Bank Morphology of the Roanoke River NWR” (02-42630-03)” under **Section 1b. Studies and Investigations** of this document.
- USACOE has agreed to fund part of the study being carried out by VA Tech Professor, Dr. Diplas, that is looking at the effects of hydropower peaking on bank stability. This study will also look at what types of flow regimes, in addition to peaking, cause the banks to collapse.
- Dr. Jerad Bales, USGS, Raleigh, has been contracted by USACOE to develop a water quality model for the lower River. The data necessary to construct a model has been assembled. A 2-dimensional coupled hydrodynamic and water-quality model for the river reach between Jamesville and Albemarle Sound has been constructed and calibrated (using the limited data) for hydrodynamics and water quality. Input data sets for the water-quality simulations have been constructed and tested. Inflow loadings from floodplain wetlands were estimated. The 1-dimensional WASP model for the river reach between Roanoke Rapids and Jamesville has been constructed and tested under simple, steady, low-flow conditions. Dr. Bales is working with the USACOE HEC – RAS modelers and EPA Region IV to develop a dynamic coupling between HEC-RAS and WASP so that unsteady simulations can be easily made. As extreme water events occur this data will be fed into EPA’s 1-dimensional WASP model to re-calibrate the model.

- Colonel Pulliam left his post at the Wilmington District Office in July. His replacement is Colonel Jefferson Ryscavage who comes to his new assignment from the Industrial College of the Armed Forces at Fort McNair, Washington, DC. It is hoped that Colonel Ryscavage shows the same interest in wanting to change flood control operations in a way that are more favorable to the downstream ecosystem.

As an aside from the section 216 study, the USACOE, with prompting from TNC, is looking at interim adjustments to the guide curve at their John H. Kerr project. In coordination between TNC, DG, and the Southeastern Power Administration the USACOE is proposing to change the guide curve in a way that would trigger releases in the spring up to 35,000 cfs in order to remove water from the system sooner. The purpose is to modify the water release schedule from Kerr/Gaston/Roanoke Rapids reservoir system to minimize impacts to downstream bottomland hardwood forests. Two sets of public hearings were held in May and August at two different locations (Williamston and Halifax) to inform landowners on the lower River who would be impacted by such change. The concern is that anything at 20,000 cfs or greater would impact agriculture fields causing significant crop loss if a growing season flood event occurs. Some of the farmers were against changing anything while others could see the need for change. Flood maps of areas flooded at 20,000 cfs and 35,000 cfs were generated and laid over aerial photos. Landowners were asked to look at their parcel of land to verify whether the information on the maps was correct. The option receiving most attention is 6B. This alternative is the best for minimizing impacts to most resources due to winter releases but there remains agriculture issues. The option would result in less frequent flooding around 20,000 cfs, but more frequent flooding around 35,000 cfs which would result in more agricultural land being flooded; however, the more frequent flood events would occur when fields haven't yet been planted during the months of March and April. Due to modeling uncertainty, a winter release test is proposed for early next year to determine the threshold of agricultural flooding. Table 6 below lays out the number of days in a month a given discharge would occur under existing operations and the proposed option 6B. This is a big step in the right direction in improving flows on the lower River. Issues with the Betterment Plan and the "spawning bubble" resulting from fish flows still need to be addressed. The water quality model may be able to offer different ramp-down scenarios that will improve the Betterment Plan. At this point it is not clear how the "spawning bubble" issue should be approached without creating tension among partners.

Table 6. Comparison of the number of days the mean daily discharge from Roanoke Rapids at a given range of flows would occur with existing operations versus option 6B. Red numbers correspond to the months that would be effected by the proposed changes in the guide curve.

Existing	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
20,000 to 24,999cfs	62	80	93	75	47	24	18	11	20	31	29	37
25,000 to 29,999	1	6	9	10	3	3	1	1	2	1	0	0
30,000 to 34,999	0	0	0	0	0	0	0	0	0	0	0	0
35,000cfs and above	1	2	1	8	6	0	0	1	3	1	0	0
Total # Days	64	88	103	93	56	27	19	13	25	33	29	37
Option 6B												
20,000 to 24,999cfs	56	62	39	17	8	5	14	14	20	32	28	41
25,000 to 29,999	0	0	1	13	6	1	0	1	2	1	0	0
30,000 to 34,999	0	0	4	9	2	2	1	0	0	0	0	0
35,000cfs and above	12	13	14	20	11	3	0	1	3	1	0	0
Total # Days	68	75	58	59	27	11	15	16	25	34	28	41

The USACOE, Wilmington Office, holds informative conference calls every Tuesday to involve stakeholders in any water management related issues in those river basins where the USACOE has flood control or water supply projects. Due to low flows on the River WB Richter listened in on only three calls this year.

Dominion Generation Relicensing Studies - See previous Annual Narratives for a history of relicensing efforts and progress. A 40-year license was issued to DG in early 2005. DG continued to follow its responsibilities under their new license agreement. For example, there is now 325 cfs of water flowing through the bypass reach. WB Richter is a member of the Cooperative Management Teams (CMTs) that will discuss the FL4-downstream ecological impacts of within-week peaking, FL3-downstream ecological impacts of within-day peaking, and FL7-downstream water quality.

The FL4-downstream ecological impacts of within-week peaking team, FL3-downstream ecological impacts of within-day peaking CMTs met twice this year to discuss progress being made on the studies being carried out under the respective articles.

The following progress has been made in getting required studies underway:

- **Effects of Hydropower Peaking on Bank Stability:** Dr. Panos Diplas, VA Tech University, was awarded a contract to determine the impacts DG's hydropower peaking has on bank stability. This study has been further enhanced through financial support by the USACOE to look at the impacts flood control operations have on bank stability. Data on soil characteristics such as pore water pressure distribution in the soil, slope stability, bank shear stress distribution, erosion, soil adhesion coefficients, etc., have been analyzed and input into a model. Some of the variables in the model being looked at are: magnitude of the base flow, magnitude of the maximum flow, time to ramp up to peaking, time to ramp down

from peaking, duration of max flow, and duration of base flow between peaking events. The next step is to determine which flow scenarios should be investigated. Each flow scenario will be analyzed with a step-by-step approach leading to a fully coupled model to determine the impacts of a flow release on erosion and riverbank stability. The coupled model will include individual models for flow, seepage, erosion, and slope stability

- **Hardwood Regeneration:** Dr. Robert Peet, UNC- Chapel Hill, is the Principle Investigator for this study. Under the guidance of Dr. Peet, Doctoral student Jackie White was recruited to carry out the hardwood regeneration study DG is required to do as part of their settlement agreement. Ms. White completed her second field season this year. Refer to past Annual Narratives for background information on design. The goal of this study is to assess the impact of Roanoke Rapids Dam operation procedures on downstream bottomland hardwood forest regeneration. Data was recorded on 118 seedling plots in which 23 new plots were added to this year's monitoring effort and 95 plots were re-sampled. Due to concerns about deer browse, deer exclosures were placed around 27 of the plots. The plots are located between Weldon and Devil's Gut and span an array of hydrological gradients on the floodplain that are impacted by DG's flow releases as well as the USACOE's releases. Forty-six plots are located in the zone of inundation when flow releases are between 6,000 – 14,000 cfs for five or more days; this is the zone that DG is thought to have an impact on during their peaking operations. Eight plots are located in the 0—6,000 cfs zone of inundation and 38, 17, and 9 plots are located in the 14,000—20,000 cfs, 20,000—35,000 cfs, and 35,000—100,000 cfs zones of inundation, respectively. Intensive seedling counts and measurements were taken on two smaller 5 m x 1 m plots nested within the bigger plot. Results from this year's field season are presented in Table 7.

Table 7. Cumulative number of seedlings by age class observed during the initial sample compared to the end of season recount. N = 118

2008	Count	Recount
< 1 year	19,076	15,770
> 1 year	15,153	12,916
Total	34,229	28,687

DG's study differs from the seedling plots monitored by WB Richter whose plots are located in the hardwood zone impacted by flows greater than 18,500 cfs. The top five species encountered in the DG study listed in order of abundance were: ash, red maple, elm, box elder, and ironwood. Ms. White's study is partially funded by FWS using challenge-cost share grant funds matched by DG; \$10,000 of FWS funds have been contributed each year to the study for the past three years. Ms. White has two field seasons left to assess the impacts of DG's operations on downstream bottomland hardwood forest regeneration. In-situ

Level Trolls have been placed in select locations near the seedling plots in order to monitor the extent and duration of flooding of the seedling plots.

- Effects of Hydropower Peaking on Benthic Macroinvertebrates: Dr. Leonard Smock, Virginia Commonwealth University, was awarded the contract to study the effects of hydropower peaking on macroinvertebrates both in-stream and in-tributaries. This year was the second year for this study. There are three questions being examined for the macroinvertebrate study: Q1) Does hydropower peaking affect the general health of the benthic community in the Roanoke River upstream of Weldon?; Q2) Is there a longitudinal effect of hydropower peaking on the benthic community downstream from the source of peaking?; and Q3) Does hydropower peaking affect the general health of the benthic community in tributaries to the Roanoke River that are inundated during peaking? Samples were collected at RM 3 near SR 48 for Q1. For Q2 sampling sites were located 2,000—2,600 m downstream of Weldon, 775—1,400 m upstream of Scotland Neck, and 300—1,000 m downstream of Hamilton. Tributaries sampled for Q3 were Quankey Creek, Halifax, NC, and Looking Glass Creek located just upstream of the HWY 258 bridge. Tyson Creek along the Tar River is serving as a reference. It is questionable whether the site sampled in Quankey Creek is an area impacted by DG's peaking operations. WB Richter worked with Mr. Drew Garey, Field Technician, and installed In-situ Minitrolls at all five sampling locations. Before any relevant data could be obtained, the Minitrolls were pulled by Mr. Garey who thought the instruments had been flooded and damaged during a rainfall event that dropped more than eight inches of rain at the study sites. It was determined that one of the sampling sites on Tyson's Creek is not an appropriate comparison for the River tributaries due to the openness and aquatic vegetation choking out the site; therefore, only one reference sampling site is present on the creek. There are three field seasons remaining for this study; in order to make the best use of this time Dr. Smock and Mr. Garey put forth to the CMT a number of recommendations to improve their study design. They include adding artificial substrate samplers, expanding the drift sampling to include an evening sampling component, discontinue winter sampling of the tributary streams, and discontinue sampling of the three longitudinal sites. Unfortunately, this year turned out to be relatively dry reducing the frequency, duration, and amplitude of peaking events coming from the Roanoke Rapids Dam so the study has not been able to sample a worse case peaking scenario. Preliminary results indicate that the upper reach of Looking Glass Creek shows greater ecological integrity than the lower reach that is within the zone of impact. Mainstem sampling carried out upstream of Weldon showed little fluctuation on the June non-peaking days and a comparatively high amount of fluctuation on the July peaking days with a rapid increase in drift rate at the beginning of each peaking cycle and reached a maximum when the rate of discharge increase was highest. Drift did not remain high throughout the peaking cycle, however, but decreased and was relatively low during most of the cycle compared to initial peaking samples.

- Effects of Hydropower Peaking on Fish Communities below the dam at Roanoke Rapids: Dr. Stephen McIninch, Virginia Commonwealth University, was awarded the contract to look at the effects of hydropower peaking on the fish communities below the dam at Roanoke Rapids. There are two questions being examined for this study: Q1) Does hydropower peaking effect fish community composition in the channel and shallow water habitats of the Roanoke River upstream of Weldon, NC? and Q2) Is there a longitudinal pattern of fish community variation away from the source of peaking? This first year of sampling provided an assessment of general fish community structure and sampling sites. One of the critical elements that need to be addressed for this study is finding an appropriate reference river so results can be compared. The James River was the intended reference for this study; however, sampling results from the James River compared to those from the Roanoke River indicated the number of exotic catfish found in the James River were too numerous thus making the James River an unsuitable reference. This year additional sampling sites to be used for comparison were located in the vicinity of Lillington, Fayetteville and Elizabethtown, NC on the Cape Fear River mainstem. The greatest difference from the Roanoke River is the significantly greater numbers of large catfishes present in the Cape Fear River system. There are also some morphological differences that merit greater investigation (e.g., lack of braided areas similar to those common in the Roanoke River Weldon area). The sampling in the Cape Fear River drainage will continue in 2009 to assess variability in functional groups of fishes between large river systems in North Carolina.

Dominion Generation Transmission Line Right-of-Ways (ROW) - WB Richter coordinated with Mike Brucato on the management of the Company Swamp DG ROW. Two danger trees were identified and cut down. Last year, in lieu of using herbicides, Mike Brucato had his crew cut and mow all the woody vegetation under the ROW during the month of December. Because of that work, no chemical spraying was necessary this year.

5a(2). Intra-agency coordination

WB Richter continued to work with Dr. Hupp, USGS, on the bank erosion study. An intra-agency agreement that was set up last year between the Refuge and the USGS, Fish and Wildlife Coop Unit, Clemson University, for work on restoring cypress trees to the swamp forests on the Rainbow Tract continues.

5b. Tribal coordination

Nothing to report.

5c(1). Private land activities (Easements)

Due to differences in how those administering the Refuge easements accounted for total landowners/tracts/acres, and errors in general, the numbers reported for easements and acres have varied over the years. With this year's easement audits we believe we finally have the correct numbers reported below.

The Refuge administers 66 conservation easements (by RO Tract - 99 easements by Refuge Tract), several of which have been subdivided, totaling approximately 116 sub-tracts. There are 87 landowners involved in these easements. These parcels are located in 19 counties in the Roanoke-Tar-Neuse-Cape Fear Ecosystem. The easements total approximately 3,128.33 acres. The average easement size is 29.03 acres with the largest easement totaling 346.2 acres and the smallest tract totaling 1.21 acres. The following is a breakdown of the holdings by county.

County	Regional Office Tract Numbers	Refuge Tract Numbers	Number of Landowners	Acres
Alamance County	2	2	5 (John Jordan = 2 tracts)	11.4
Bertie	1	2	1	50.32
Bladen	1	1	1 (NCWRC)	37.96
Caswell	3	3	3	101.23
Cumberland	3	3	3	140.98
Edgecombe	2	2	2	60.67
Franklin	3	3	3	119.8
Gates	1	1	1	82.2
Halifax	3	6	3	83.80
Harnett	1	2	2	42.14
Hertford	1	1	1	125.79
Martin	1	1	1	26.93
Nash	7	18	8	305.69
Northampton	9	10	10	225.63
Orange	5	5	12	47.67

Rockingham	1	1	1	74.73
Sampson	19	35	21 (NCWRC = 7 tracts)	1554.02
Wake	2	2	2	25.44
Wilson	1	1	1	11.93
TOTAL	67	99	84	3128.33

All easements are classified as palustrine forested wetlands (Cowardin et. al. 1979 *Classification of Wetlands and Deepwater Habitats*). Using the general wetland habitat types defined by the "Department of Environment, Health and Natural Resources 1996, *A Field Guide to North Carolina Wetlands*," the holdings include bottomland hardwoods, pocosin, swamp forest, headwater forest, and beaver swamp complex. These latter classifications should be viewed as tentative.

For background on the Lee-Mt. Olive-Clinton transmission line right-of-way and for a review of the progress that has been made on this issue in previous years refer to **Section 6c. Manage permits and economic uses** in Annual Narratives from 2003-2006.

RM Chappell spoke with Buzz Bryson, Progress Energy, in July 2007 regarding the alternative right-of-way for the transmission line and the need for an official request with other documentation. The FWS Southeast Regional Office (RO) received the official request from Mr. Bryson in September 2008 and signed approval November 2008.

To date there has been no law enforcement action by ZO Canada or SA Baker on the Orange County 13C easement encroachment/motorcross activity damage. This is the easement that was subdivided, sold with lots, and currently has approximately nine different landowners. ZO Canada, SA Baker, PLB Smith, and RM Chappell visited easement 13C in Orange County on 11 September 2007 to assess the damage from the motorcross activity and look at rehabilitation.

As a piggyback to the Congressional review of easements in Mississippi, RO requested a site inspection report on all easements being administered in the Southeast Region. Landowners were to be contacted reminding them that they hold title land that contain an easement and provide them a copy of the deed with easement language. The inspection covered who owned the property, acreage, distance from nearest FWS office, compliance, date easement conveyed to FWS, description of resource value, and a determination by the RM as to whether the easements should remain in FWS control, be transferred to another willing resource agency, or be divested. Inspections were conducted by RM Chappell and EEO Wilkins (58), WB Richter (15), and PLB Kendall Smith, Columbia Migratory Birds Office (26). Of the 99 easements it was recommended that 15 should continue to be managed by FWS, 12 should be divested, 8 should be transferred to NCWRC, 16 should be divested or transferred; 45 should be managed by FWS or transferred; and 3 should be transferred to another resource agency. OA Jager researched County land records and GIS data and provided an up-to-date listing of all landowners with addresses and phone numbers, copies of GIS maps with the easement identified, and directions to the easement. She also sent each landowner a certified letter, with delivery confirmation, notifying them of their ownership of an easement and

provided them with a copy of the deed. She kept detailed records on receipt, return, and change of address for each letter. Each easement file was updated with this information along with a copy of the landowner letter and a copy of the Site Inspection Report.

5c(2). Private land activities (Partners)

Nothing to report.

5d. Oil & gas activities

Nothing to report.

5e. Cooperative/Friends organizations

Partnership for the Sounds (PFtS) – WB Richter assisted the PftS Roanoke-Cashie River Center with kids' day for the Ahoskie Christian Academy and captained the pontoon boat a couple weekends for their summer boat rides.

Roanoke River Partners – Executive Director Cyndi Tripp turned in her resignation; lack of funds to cover her salary was the primary reason. An active and motivated Board of Directors is keeping the Roanoke River Partners afloat until funds are available to hire a new Director.

Roanax Sponsas Society, Inc. (RSS) – The Friends Group has been “put on ice” at this time due to lack of community interest. Due to banking fees that were depleting funds, the Friends Group bank account was closed and the money (\$722.15) was placed, temporarily, with the Coastal Wildlife Refuge Society (Alligator River NWR's Friends Group) for safekeeping.

Albemarle-Pamlico Conservation and Communities Collaborative (AP3C) – This collaborative was formed last year by TNC, DU, and the Environmental Defense Fund. The mission of the AP3C is three fold: 1) Develop approaches that integrate economic and ecological resilience for the lands, waters, and communities of the Albemarle-Pamlico Region; 2) Recognize the challenges presented by economic and social distress, climate change, population change, and increasing risks to public health; and 3) Implement collaborative, sustainable solutions for well-being. The AP3C provides an open forum to identify and pursue opportunities for collaborative action among participants and to enhance the coordination of their individual projects. In other words, this collaborative provides a great opportunity to network with people working within the region who have a concern for protecting the natural resources of the region but also recognize the need for economic growth and social well-being. It allows for smart, sustainable growth in the region. Refuge Staff attended two meetings/workshops.

6

Resource Protection

6a. Law Enforcement

There is no permanent law enforcement presence at the Refuge. ZO Canada continues to provide limited law enforcement during Refuge hunts. Violations reported this year include the new Town Swamp directional sign, in curve, being shot, 2 drug charges, 1 arrest for probation violation and possession, 2 litter violations, 1 undersized largemouth bass violation, and 2 fishing license violations.

6b. Wildfire preparedness

The Refuge is still working under an Interim Fire Management Plan. It is hoped that a final plan will be complete in 2009.

6c. Manage permits and economic uses

For background on the Lee-Mt. Olive-Clinton transmission line right-of-way and for a review of the progress that has been made on this issue in previous years refer to this section of the Annual Narratives from 2003-2006. Additional information on the issue is included in **Section 5c(1) Private land activities (Easements)**.

6d. Contaminant investigation and cleanup

There is still no settlement agreement for the old Weyerhaeuser, now Domtar, pulp mill in Plymouth. The EPA, FWS, National Marine Fisheries Service, and NCWRC have been negotiating a settlement from the data collected in a Natural Resources Damage Assessment but with new personnel in place negotiations hit a snag. FWS Contaminants Biologist Tom Augspurger, Raleigh FO, has told us that due to the snag, negotiations have been set back to square one. A final settlement may be a ways off.

6e. Manage water rights

Nothing to report.

6f. Manage cultural resources

Nothing to report.

6g. Federal facility compliance act

Nothing to report.

6h. Land acquisition

Nothing to report.

6i. Wilderness and natural areas

Nothing to report.

6j. Threats and conflicts

Nothing to report.

7

Alaska Only

8

Public Education and Recreation

8a. Provide visitor services

Hunting – All hunt opportunities for the Refuge are administered by the North Carolina Wildlife Resources Commission (NCWRC) as part of the state's special hunt opportunities. Permits are drawn and issued by the NCWRC. Many hunting opportunities were available on the Refuge for 2008.

Four 3-day turkey hunts were offered, as well as the annual youth turkey hunt. Turkey hunts began 17 April and ended 10 May.

Conine Island offered hunters early and late season waterfowl hunts in accordance with North Carolina State seasons. Small game hunts were offered seven times between 13 October and 31 December. The entire month of December is open to small game hunting (Monday—Saturday).

Deer hunting was available on five Refuge tracts - Broadneck, Company Swamp, Conine-Askew, Great and Goodman Islands-Hampton Swamp, and Town Swamp. The archery season was open 13 September–10 October. Muzzleloader season was open from 11–17 October. Five three-day regular gun hunts were offered beginning 23 October. There is no accurate way to collect data on hunter show rates at the Refuge.

8b. Outreach

Information Booths, Talks etc. -

WB Richter

- Staffed a booth at the Roanoke Chowan Wildlife Club's National Hunting and Fishing Day 20 September

OA Jager

- Staffed a booth at the North Carolina State Fair 24 October.

Interpretive Materials – The Refuge purchased numerous interpretive outreach materials this year. We now have quite a few pelts, skulls, and tracks along with interpretive cards, and educational wildlife games and activities. We are looking forward to providing more educational outreach to the local schools and community.

9

Planning and Administration

9a. Comprehensive management planning

Nothing to report.

9b. General administration

The Refuge finally finalized a GSA lease for the building adjacent to Refuge headquarters that we have been temporarily renting as the maintenance facility. The Town of Windsor finalized their purchase of the property and, in turn, submitted a winning GSA bid.

Staff had to learn new ways of doing business when the internet based Quicktime and GovTrip programs came on line. Quicktime is the FWS' new time and attendance program and GovTrip is the new travel program. It has taken a while, but staff proved that even "old dogs" can learn new tricks!

21 July–5 August, EEO Wilkins assisted with operations of heavy equipment in the fighting of the Evans Road Fire. This was a wildfire that began as a result of a lightning strike on private land south of Pocosin Lakes NWR, encompassed over 40,000 acres and involved over 400 Local, County, State, and Federal personnel. 60% of acreage burned belonged to Pocosin Lakes NWR with the remaining being owned by State or private entities. Due to the massive amount of peat involved in this fire, by year's end it had still not been declared officially out.

All 99 easements administered by the Refuge received an intensive site inspection. See ***Section 5c(1). Private land activities (Easements)*** for details. This was an arduous undertaking for staff, involving extensive research and travel time, but we managed to complete the task on time.

OA Jager continued to work on the station's RPI and excess equipment. It is beginning to look like there may be a light at the end of this tunnel after all. Hopefully the lists will be ready for verification by the beginning of 2009.

This was the fourth field season for the Swainson's warbler productivity study on the Refuge. Refuge staff assisted researchers with logistics of gathering and signing out equipment needed for the study. See "Roanoke River NWR "Investigating Influences on

Swainson's Warbler Nest Survival in a Bottomland Hardwood System Subjected to Asynchronous, Aseasonal Flooding" (04-42360-01)" under **Section 1b. Studies and Investigations** for details.

In July RM Chappell continued communications with Jeanette Harrison, RO-Realty, regarding obtaining a right-of-way into the Town Swamp Unit. A legal right-of-way into the Town Swamp Unit still has not been finalized.

OA Jager initiated the second round of paperwork for the announcement to hire a Biological Science Technician. The first round ended with none of the applicants selected being available due to RO Division of Refuges delay in getting our pick to RO Division of Human Capital Management (HCM) and then HCM's delay in notifying our selection. We hope this round goes much smoother.

OA Jager continued to provide administrative support to Mackay Island NWR weekly until the hiring of their new OA, Sue Spry in April. She continued her visits for the next two months in order to provide training for OA Spry and continues to offer support and training via telephone and computer contact.

RM Chappell attended the Project Leaders Meeting in Auburn, AL and worked a two week detail at Cape Romain NWR, Awendaw, SC.

RM Chappell finalized coordination of an agricultural explosives training opportunity offered through Omni Distribution for employees at NC/SE VA Refuges and NCWRC experiencing beaver problems. The training was held in 17 June at Williamston, NC.

RM Chappell and WB Richter attended a number of Strategic Habitat Conservation meetings.

EEO Wilkins continues in his capacity as MOCC instructor at Savannah and Santee NWR's.

WB Richter visited White River, Cache River, and Yazoo NWR's to learn more about Forest Management Practices in Bottomland Hardwood Forest Systems

OA Jager attended the Regional Administrative Workshop in Atlanta, GA. This was the first time this workshop has been held in many years and was appreciated by all who attended. There have been so many changes in personnel and procedure in recent years that it is hard to keep up with everyone and everything. A training session like this is needed on a more frequent basis.

The following is a list of employees who were members of the 2008 Roanoke River National Wildlife Refuge staff:

<u>Permanent Full Time</u>	<u>Grade</u>	<u>EOD</u>
Michelle H. Chappell Refuge Manager	GS-07	04/21/03
Jean M. Richter Wildlife Biologist	GS-12	05/12/96
Doak Wilkins Engineering Equipment Operator	WG-10	01/04/98
Sherrie E. Jager Office Assistant	GS-06	08/20/95

Volunteers and Interns

No interns were hired this year; however, there were a total 123 volunteer hours. Jim Brown and Curt Kedley each volunteered 35 plus hours to build 29 wood duck boxes for the Refuge. Additional volunteer hours were spent assisting WB Richter with banding wood ducks, assisting graduate student William deGravelles with the hacking and injecting of tupelo trees in the study plots on Broadneck Swamp, checking wood duck boxes, and planting hardwood trees in former timber harvest staging areas on Town Swamp. The Refuge held a small appreciation lunch for Mr. Brown and Mr. Kedley at the Heritage House in Windsor on 12 December. Mr. Brown and Mr. Kedley both received Volunteer T-shirts along with our many thanks for their support and hard work.

Training

Michelle Chappell

- B3 Combination Helicopter/Airplane Safety, Manteo, NC, 29 Jan 08
- M3 DOI Aviation Management Training for Supervisors, Manteo, NC 29 Jan
- 2008 Orientation to the Privacy Act, Online, DOI Learn, 20 Mar
- 2008 Records Management Awareness, Online, DOI Learn, 20 Mar
- 2008 Fed Info Systems Security Awareness, Online, DOI Learn, 25 Mar
- Quicktime Employee, Online, NBC, 31 Mar
- Quicktime Certifier, Online, NBC, 31 Mar
- GIS Intro for Conservation Professionals (TEC 7112), Cookeville, TN, 20-22 May
- Introduction to Agricultural Explosives, Omni Explosives, Williamston, NC, 17 Jun
- GovTrip Travel Authorization Vouchering System, Online/Teleconference, 22 Jul
- GovTrip Travel Authorization Vouchering System, Approving Official, Online/Teleconference, 24 Jul

- Wireless Security Training, Online, 12 Aug
- Computer Security Incident Response Overview, Online, DOI Learn, 18 Aug
- Computer Security Incident Response Training (CSIRT), Online, DOI Learn, 18 Aug

Sherrie Jager

- Cardholder Travel/Purchase Refresher, Online, NBC, 14 Jan
- Quicktime Employee, Online, NBC, 15 Jan
- Quicktime Timekeeper, Online, 15 Jan
- 2008 Records Management Awareness, Online, DOI Learn, 20 Feb
- 2008 Orientation to the Privacy Act, Online, DOI Learn, 20 Feb
- 2008 Fed Info Systems Security Awareness, Online, DOI Learn, 5 Mar
- Quicktime Certifier, Online, NBC, 18 Mar
- GovTrip Travel Authorization Vouchering System, Online/Teleconference, 22 Jul
- GovTrip Travel Authorization Vouchering System, Approving Official, Online/Teleconference, 24 Jul
- Microsoft Excel, Fred Pryor, Rocky Mount, NC, 21 Aug
- Project Officers Workshop, RO, Atlanta, GA, 26 Aug

Jean Richter

- Wildfire Powersaws S-212, US Parks Service, Manteo, NC, 4-6 Mar
- 2008 Orientation to the Privacy Act, Online, 14 Mar
- 2008 Records Management Awareness, Online, 18 Mar
- 2008 Fed Info Systems Security Awareness, Online, DOI Learn, 19 Mar
- Cardholder Travel/Business Line, Online, NBC, 21 Mar
- Quicktime Employee Training, Online, NBC, 18 Apr
- GovTrip Travel Authorization Vouchering System, Online/Teleconference, 22 Jul
- 2008 Fred Pryor Seminar on Excel and Advanced Excel, 21-22 Aug.
- Project Officers Workshop, RO, Atlanta, GA, 26 Aug
- Facilitation Training, RO, Atlanta, GA, 9-10 Dec

Doak Wilkins

- Wildlife Powersaws Refresher, US Parks Service, Manteo, NC, 6 Mar
- 2008 Fed Info Systems Security Awareness, Online, DOI Learn, 11 Mar
- 2008 Records Management Awareness, Online, DOI Learn, 11 Mar
- 2008 Orientation to the Privacy Act, Online, DOI Learn, 11 Mar
- Quicktime Employee, Online, NBC, 11 Mar
- Cardholder Travel/Purchase Business Lines, Online, NBC, 11 Mar
- Introduction to Agricultural Explosives, Omni Explosives, Williamston, NC, 17 Jun

FEEDBACK

One of the few bright notes of 2008 was the dissolution of the Table 5 Workforce Plan. Staff whose positions were listed can now breathe a sigh of relief and focus more on the job at hand than the threat lingering over them.

Challenges over this past year have included a NAWCA/Ducks Unlimited/Refuge levy project that is not working as well as hoped. Design flaws have hampered staff efforts to evaluate the effectiveness of the project. Old disintegrating culverts and an ever growing beaver population have also created challenges in water management. Hopefully 2009 will see some progress in these areas.

RM Chappell transferred from FWS Southeast Region to FWS Southwest Region effective 24 May 2009. She did not complete her portion of the Annual Narrative, nor the Feedback section, before transferring. With personnel changes, complexing of the station, vacant positions remaining unfilled, and FWS policy changes in general it has been a rather hard few years on the Refuge.